SERIES 3, Vol. 11, No. 7 JULY, 1928

AMERICAN JOURNAL OF OPHTHALMOLOGY

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Subscription twelve dollars yearly. Single number, one dollar twenty-five cents.

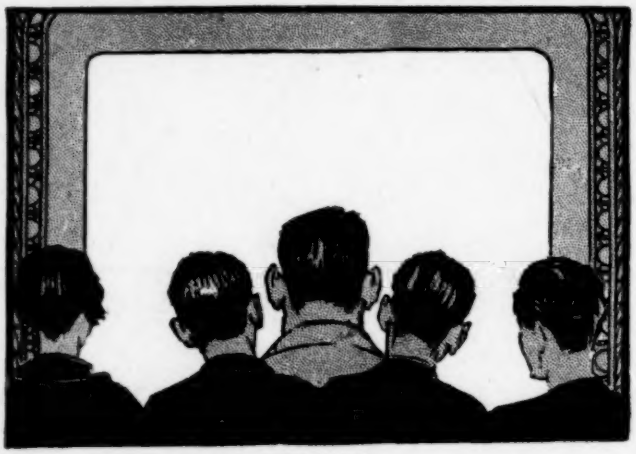
PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

PUBLICATION OFFICE: 450 AHNAIP STREET, MENASHA, WISCONSIN

EXECUTIVE OFFICE: 7 WEST MADISON STREET, CHICAGO, ILLINOIS

EDITORIAL OFFICE: 530 METROPOLITAN BUILDING, DENVER, COLORADO

Entered as second class matter at the post office at Menasha, Wisconsin



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Sioux Falls, So. Dakota
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FIG. 1. TUBERCULOSIS OF PALPEBRAL CONJUNCTIVA. (BARTOS AND MOTTO

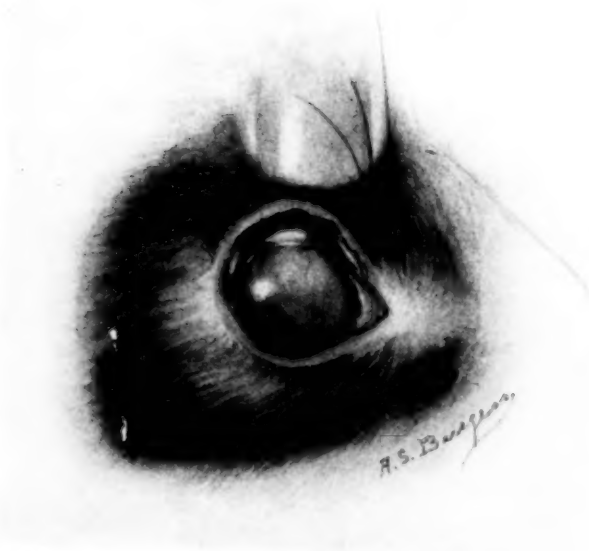

FIG. 2. EXPERIMENTAL LUETIC KERATITIS IN RABBIT. (C. A. CLAPP)

AMERICAN JOURNAL OF OPHTHALMOLOGY

Volume 11 July, 1928 Number 7

THE REGIONAL DIFFERENTIATION OF THE VERTEBRATE RETINA

Arris and Gale Lecture, 1928

IDA C. MANN, M.B. Lond., F.R.C.S. Eng.

The main processes involved in the development of the eye are similar in all vertebrates. The modifications of structure which occur in different species involve the region of the retina below the optic disc. The upper region of the retina is therefore considered by the author as "stable" in phylogeny, the lower as "fluid." Ontogenetically and phylogenetically the fluid lower region is younger than the stable upper region, and there is a relationship between this fact and the predominant frequency of congenital malformations in the lower part of the eye.

The work represented by this paper was done under the auspices of the Medical Research Council of Great Britain. Dr. Mann, who has made very extensive studies in the embryology of the eye, is Assistant Surgeon at the Royal London Ophthalmic (Moorfields) Hospital, and Pathologist at the Central London Ophthalmic Hospital. This lecture was delivered at the Royal College of Surgeons, London, February 17, 1928.

The vertebrates, when considered with regard to their eyes, show a remarkable uniformity of structure, which is in sharp contrast to the great diversity present among invertebrates in this respect. In the latter group there are to be found very many different types of visual organ bearing little or no resemblance to each other in origin, adult structure, or physiological mode of action, while among the former development is very constant throughout the class, even often in remarkably minute details of histological differentiation, the end result, both anatomically and physiologically, being in all cases strictly comparable. There are of course many minor variations apparent in different species, but these can be reduced to order from embryological considerations and can be shown to be strictly limited to certain less stable regions of the optic "anlagen," variations in which have produced a phylogenetic series of alterations which does not affect the constancy of the basal vertebrate type.

In the case of the retina it is possible to show, by examination of the developing eyes of various kinds of animals, which regions may be considered as stable in phylogeny (their individual ontogeny being always the same), and which are "fluid," i.e., variable, and give rise to the differences apparent between species.

The origin of the retina from the walls of the optic cup

In all vertebrates the eye is cerebral, that is to say, the essential percipient portion is developed as an outgrowth from the neural ectoderm of the central nervous system. This outgrowth, the optic vesicle, arises from the lower and back part of the forebrain and grows outward toward the surface. The original hollow outgrowth (or optic vesicle) soon becomes converted into a double-layered cup by the process of invagination of its outer and lower walls.

This process is well known and has been constantly observed in all classes of vertebrates. It appears to be the same in them all and invariably leads to the formation of a double-layered cup indented below by a cleft, the fetal fissure, which runs up on to the under side of the stalk which connects the cup with the forebrain. The inner and outer walls of the cup finally come into apposition but never completely fuse. From them are developed the cell and fiber layers of the adult retina, the inner wall of the cup giving rise to all the layers of the retina from the membrana limitans interna to the outer limbs of the rods and cones inclusive, the outer wall remaining thin and developing into the retinal pigment epithelium only.

The process of differentiation of the retinal layers from the inner layer or wall of the optic cup is a complicated one, but is remarkable for its uniformity throughout the vertebrates. The basal plan which can be recognised in all the species so far examined is as follows. The inner wall of the optic cup at first consists of a simple neuroepithelium, which very soon develops a nucleus-free zone, or marginal layer, on its inner surface.

At this time all the nuclei of the neuroepithelium are oval in shape and are capable of undergoing mitosis. The beginning of differentiation into layers is marked by a change of shape of some of the innermost nuclei from oval to spherical and their coincident migration inwards into the marginal zone. After their change in shape they are incapable of dividing.

These spherical nuclei thus form a layer, the inner neuroblastic layer, lying in the marginal zone internal to the rest of the (still oval) nuclei of what may now be called the outer neuroblastic layer. The two neuroblastic layers are separated by an interval of varying width, the transient fiber layer of Chievitz. The cells of each of the two neuroblastic layers thereafter undergo further differentiation, each of the layers giving rise to three kinds of cell. The inner neuroblastic layer produces ganglion cells, amacrine cells and supporting cells (e.g. Müllerian fibers), while the outer neuroblastic layer forms, later, bipolar cells, horizontal cells, and rods and cones and their nuclei.

The cellular differentiation spreads from within outward through the retina, the rods and cones being the last to appear and the differentiation of each type of cell (except usually the glial cells) being accompanied by a change of shape of the nucleus from oval to spherical. The fiber layers are formed a little later than their accompanying cells, the nerve fiber layer being the first to appear and being recognizable soon after the appearance of the inner neuroblastic layer.

The inner molecular layer is formed by the separation of the amacrine cells and supporting cells from the rest of the inner neuroblastic layer. These subsequently fuse with the layer of bipolar nuclei, the transient fiber layer of Chievitz disappearing in the process. The outer molecular layer appears late as a split in the outer neuroblastic layer between the horizontal cells and the nuclei of the rods and cones.

First Stage	*Second Stage*	*Third Stage*	*Adult*
		Nerve fiber layer	Nerve fiber layer
		→Ganglion cells	Ganglion cells
			Inner molecular layer
Marginal layer	→Inner neuroblastic layer	→Amacrine cells	
		→Müllerian fiber nuclei	Inner nuclear layer
	Transient layer of Chievitz		
		→Bipolar cells	
Primitive neuroepithelium	→Outer neuroblastic layer	→Horizontal cells	Outer molecular layer
		→Rod and cone nuclei	Outer nuclear layer
Basement membrane			External limiting membrane
Cilia	Cilia	Primitive rods and cones	Rods and cones
Outer wall of optic cup	Pigment epithelium		Pigment epithelium

These changes can be roughly divided into three periods and represented schematically as shown above.

Individual variations, such as differences in width of certain of the layers, abbreviation and slurring of stages, and variations in actual size of cells, occur in some species, but the general plan is the same in all the species so far examined, which include examples from among fish, amphibians, reptiles, birds, mammals, and even one of the Cyclostomes (Petromyzon). Whatever minor variations may occur there is no exception to the rule that the ganglion cells (and glial cells) appear first and that the nerve fiber layer

begins immediately after this. Thus an exactly comparable stage of retinal development exists in every vertebrate embryo. As will be seen later, this is of the utmost importance in making comparisons of shape and relative size between various species, since it allows of reference to a definite stage in each case.

The stages above described do not take place simultaneously over the whole inner layer of the optic cup. They commence in a definite area at the posterior pole bounding the insertion of the optic stalk or primitive epithelial papilla in its upper third or half. This area corresponds with the region on the surface of the primary optic vesicle at which the process of invagination commenced, and which has therefore represented from the first the most advanced portion of the optic outgrowth. It is therefore also the oldest region from a developmental point of view.

From this area differentiation spreads peripherally and downward toward the margins of the fetal fissure, but it is always markedly delayed in the lower part of the cup. It is not uncommon to find that in the older area above the stalk development has progressed to the formation of an inner and outer molecular layer before the areas bounding the cleft have got beyond the stage of commencing migration of ganglion cells (the Ganoid fish, Amia calva, is a good example of this delay in differentiation in the lower part of the eye). Thus, considered from the point of view of retinal differentiation only, a difference in behavior between the upper and lower parts of the eye can be recognized.

In this way we arrive at an arbitrary division of the developing retina into an upper region lying above the optic stalk and a lower lying below this and including the areas bounding the fetal fissure on each side. If we examine the development of these separately we shall find that there exists not only a difference in rate of retinal differentiation in the two areas but also an even more marked difference in general shape and mode of growth.

In the first place it is obvious at the beginning that the upper area is much the larger, the lower only coming into being after invagination has included the base of the optic stalk and led to the formation of the fetal fissure. Figure 1 shows the outline of vertical sections through the optic cup in the early stages in various animals.

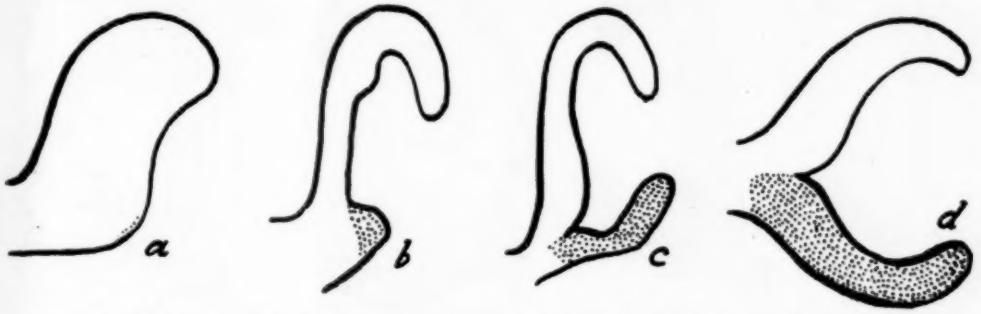

Fig. 1. (Mann.) (The lower retinal area is shown stippled.) *a*, section through the early optic cup of a human embryo. *b*, section through the early optic cup of a chick. *c*, section from the slightly more advanced embryo of a Ganoid fish. *d*, section through the fully formed optic cup of a mouse embryo.

Section *a* is through the eye of a 4.5 mm. human embryo in which there is as yet no fetal fissure, the optic stalk being inserted at the lowest part of the cup and there being in consequence no retinal area below this. Section *b* is from a chick embryo in which the lower retinal region is just appearing as a small lip (stippled) on either side of the fissure. Section *c* shows this lower region increasing in size (in a slightly older embryo of a Ganoid fish, Amia calva). Section D represents an em-

bryonic mouse eye in which the lower region equals the upper in extent.

It is thus obvious that the lower region of the retina is added to the upper in ontogeny by growth of the areas bounding the fetal fissure. It will become apparent by a study of representative forms that the delayed appearance of the lower retinal area is not merely ontogenetic in each species but also exhibits a phylogenetic counterpart throughout the vertebrate order, appearing earlier and becoming better marked the higher the animal in the scale. Thus the lower retinal area can be looked on as phylogenetically younger than the upper and hence may be expected to be less stable than that, and to exhibit the power of individual modification from time to time.

This can be seen to be actually the case when we remember that most of the variations found in the intraocular arrangements of the vertebrates are intimately connected with the optic disc or with the retina below this in the line of the old fetal fissure. (For example here one can mention, among others, the processus falciformis of Teleosteans and the pecten of birds.)

The upper retinal region on the other hand is remarkably stable. It appears very early in ontogeny and merely increases in area and curvature throughout development. The layers differentiate acording to the basal vertebrate plan described above, and in no case is there developed from it any structure other than retina between the disc and the ora serrata.

The ontogenetic and phylogenetic developments of the lower retinal region will now be followed in greater detail. In the first place the increase in area alone will be considered, and in the second the modifications of structure which arise here and there in different species. While the increase in area for a given stage of ocular development is steady and constant throughout the vertebrate scale, the secondary modifications of structure are sporadic and are probably related much more closely to the environmental needs of the species in question than is the increase in area. Since the lower region is the youngest and hence the most fluid it is here that adaptive modifications would be expected.

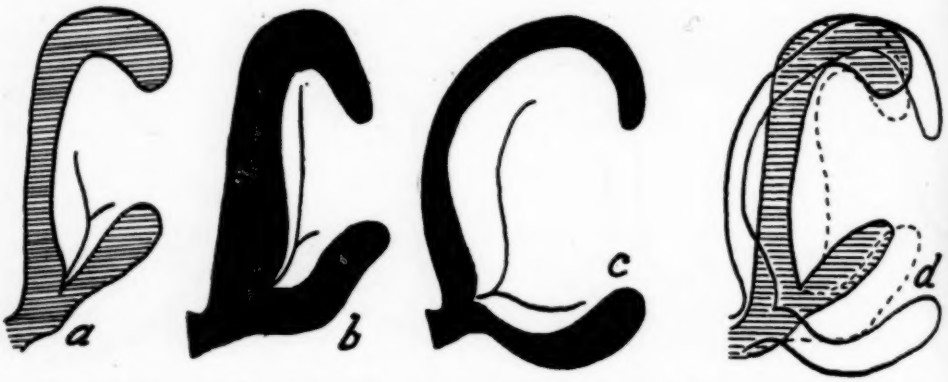

Fig. 2. (Mann.) Vertical sections through three stages in the growth of the optic cup in Amia calva. *a*, *b*, *c*, the three stages. *d*, the three stages superimposed. *a* shows the earliest nerve fibers.

In order to compare stages of development in different species, when the size of the individual embryos and the length of their respective periods of development show great differences, it is necessary to adopt some criterion based on the stage of development of the eye itself. The stage which will be found most convenient, as it can easily be recognized in all vertebrate embryos, is that at which nerve fibers first become visible in the upper retinal area just above the upper edge of the optic papilla. In the series of diagrams which follows, this stage is always represented by shading with horizontal lines, so that in all the animals

shown this stage can be taken as comparable.

It is now proposed to follow the ontogeny of the lower retinal area in early stages of some representative animals.

As an example of a primitive fish one can consider the Ganoid, Amia calva (the American bowfin). In this animal the shape of a median vertical section of the optic cup at an early stage is that seen in figure *2a*. The cup appears flattened from before backward, the stalk is inserted into its lower part, and the lower retinal region is represented only by a short inferior lip which lies actually at this stage still on a higher level than the insertion of the stalk. The hyaloid artery runs straight upward, giving a small forward running branch at right angles to itself.

The upper retinal region in this specimen is still mainly in the stage of undifferentiated neuroepithelium, but immediately above the papilla there is a small area in which early ganglion cells and a few nerve fibers can be recognized. The lower retinal region (the inferior lip of the cup) is completely undifferentiated and contains numerous mitoses in all its layers, showing that active increase in size is taking place here. This growth of the lower region is apparent in the next two specimens, seen in figure *2b* and figure *2c*. In figure *2b* the lower area has begun to increase and the cup has the appearance of opening out slightly.

This is more apparent in figure *2c* which shows the lower retinal region definitely increased in size and opened out, so that the cup is much more spherical and the lower area lies definitely below the optic stalk. The hyaloid artery now divides on the disc into an upper and lower branch. The stalk is, however, still inserted very much toward the lower part of the eye.

The stage of retinal differentiation reached in the specimen in figure *2b* is but little in advance of that in figure *2a*. There are a few more nerve fibers in the upper region, but the lower is still completely undifferentiated. In figure *2c*, however, all the retinal layers are present over both upper and lower areas, though the fiber layers have not yet reached their final thickness.

This specimen is therefore almost fully differentiated, yet there is still a great disparity between the size of the upper and lower retinal areas. (Of course the actual sizes of these three eyes, *a*, *b*, and *c*, are very different. The sections have been enlarged to approximately the same size for purposes of comparison, and are not shown at the same magnification. This applies to all the subsequent schematic drawings.) Figure *2d* shows the three stages superimposed for comparison.

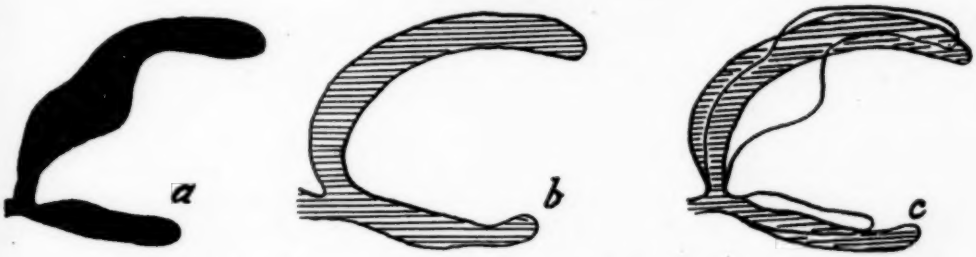

Fig. 3. (Mann.) *a* and *b*, two stages in the growth of the optic cup in Acanthias. *c*, the two superimposed. Nerve fibers are first visible in *b*.

Thus in Amia calva the growth of the lower part of the cup lags markedly behind that of the upper. The same thing in another fish can be seen by comparison of two stages in Acanthias, the dogfish. These are seen in figures *3a* and *b* (figure *3c* showing the two stages superimposed). In the specimen seen in *a* there are no nerve fibers or ganglion cells anywhere in the retina either above or below the disc. The lower retinal area is, however, rela-

tively slightly larger in the dogfish than it is in a corresponding stage in Amia calva. At the stage shown in figure 3*b* a few ganglion cells and nerve fibers are present, so that this stage of general retinal differentiation corresponds to that in figure 2*a*. The opening out of the cup and advance in development of the lower area is apparent.

of nerve fibers (figure 4*a*), the later corresponds to the stage of appearance of the inner molecular layer just before the fusion of the amacrine cells with the bipolars. There is not a marked difference between the two, but when they are superimposed it is apparent that extension and opening out of the lower part of the cup are taking place.

Fig. 4. (Mann.) Two stages (*a* and *b*) of the optic cup in Necturus. *c*, the two stages superimposed. Nerve fibers are visible in *a*.

Passing to the Amphibia, we find the same process occurring, with very little difference from the fish in relative time and rate of development of the lower area. In the early stages the retina appears somewhat thicker in the Amphibia than it does in the fish, and from the beginning the eye is not so much flattened anteroposteriorly. Figure 4 shows two stages in a Urodele amphibian (Necturus). The earlier Necturus marks the stage of the first appearance

As an example from the Anura we can consider the frog. Figure 5 shows three stages in the growth of the optic cup of a tadpole, and also a composite drawing of them superimposed for comparison. Figure 5*a* shows a stage (about the eighth day) at which there is no differentiation of layers at all, but the walls of the cup are very thick, as they are in the Necturus embryos seen in figure 4. The lower area is very small indeed and is directed

Fig. 5. (Mann.) *a*, optic cup of frog tadpole of eight days. *b*, optic cup of frog tadpole of sixteen days with nerve fibers. *c*, optic cup of frog tadpole just before metamorphosis. *d*, composite diagram of *a*, *b*, and *c*.

slightly upward as in the earliest Amia (figure 2*a*).

Figure 5*b* (sixteen days) is the stage at which ganglion cells and nerve fibers are present. The retina as a whole has thinned and the lower region has increased in size and is directed horizontally. Figure 5*c* is the eye of a tadpole just before metamorphosis. All the layers are complete all over the retina. The cup has opened out, and the lower area, directed downward, is much larger than it was but still is smaller than the upper area.

In the animals so far examined it is noticeable that at the appearance of nerve fibers in the upper retina the lower is still very small, flattened, and directed upward or horizontally.

Among the Sauropsida we find a marked advance in the lower area, since it is already opening out, beginning to be directed downward and showing a curved surface at the time of appearance of the first ganglion cells in the upper retina. As an example of a reptile we can consider the snapping turtle, Chrysemys marginata. Figure 6 shows three stages and a composite drawing of them.

Figure 6*a* is a stage possessing a marginal layer but no ganglion cells or nerve fibers anywhere in the retina, yet the general shape of the cup is as advanced as that of the Amia in figure 2*b*, which already shows ganglion cells in the upper area. In figure 6*b* the cup is opening out, the lower region shows a slight downward curve, and in this specimen there is a nerve fiber layer in the upper retinal region. A very few nerve fibers are recognizable on the lower area as well, close to the optic disc. Figure 6*c* shows a later stage at which all the retinal layers are present all over the retina (though not of their final thickness), and the lower region is much greater in extent than before.

Among the birds the increase in the lower area and the acceleration of its appearance are more apparent still. Figure 7 shows changes in the eyes of five chick embryos.

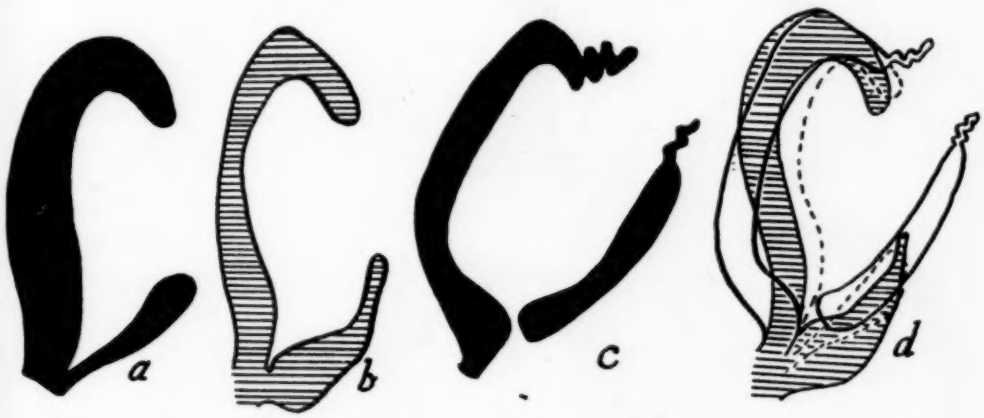

Fig. 6. (Mann.) Three stages *a*, *b*, and *c*, in the growth of the optic cup of Chrysemys marginata and composite drawing, *d*. Nerve fibers are beginning in *b*. The ciliary region is visible in *c*.

Figures 7*a* and *b* are early (third day) stages. There is no retinal differentiation at all in upper or lower regions, other than the appearance, in 7*b*, of a narrow marginal layer. The lower retinal area however is apparent, is directed slightly downward, and is curved. Figure 7*c* is the stage of appearance of nerve fibers. A small bundle only of them is present in the upper edge of the optic papilla. The lower region is however now quite well marked. From this time onward it extends rapidly, and figures 7*d* and *e* show two subsequent stages, the retina still showing only ganglion cells and nerve

fibers, and none of the outer layers. The increase in area and curve of the lower region is much more marked for the stage than in any of the previous animals examined.

This increase in the lower retinal area reaches its acme in the mammals. Figure 8 shows two stages in the mouse, *a* being just before and *b* just after the appearance of nerve fibers above the optic stalk. The size of the lower retinal area and its general form and direction resemble those of the upper region as soon as the nerve fibers appear.

The same thing is seen even more definitely in human embryos. Figure 9 shows three stages. Figure 9*a* is from a 5 mm. human embryo. The lower retinal area is only just recognizable, but from its inception it is directed downward, the stage of an upward pointing lower region found in the fish and amphibians not being represented at all in man. In this embryo there is no differentiation other than the beginning of a marginal layer. The next stage (7.5 mm.), also long before the appearance of nerve fibers, shows an increase in the lower area, which now resembles somewhat the fish stage in figure 2*b*. Ganglion cells begin to differentiate at the 12 mm. stage and nerve fibers are present in the 17 mm. embryo, the eye of which is seen in figure 9*c*. The lower area is exactly similar to the upper in shape and size, thus showing a very marked advance on all the nonmammalian vertebrates.

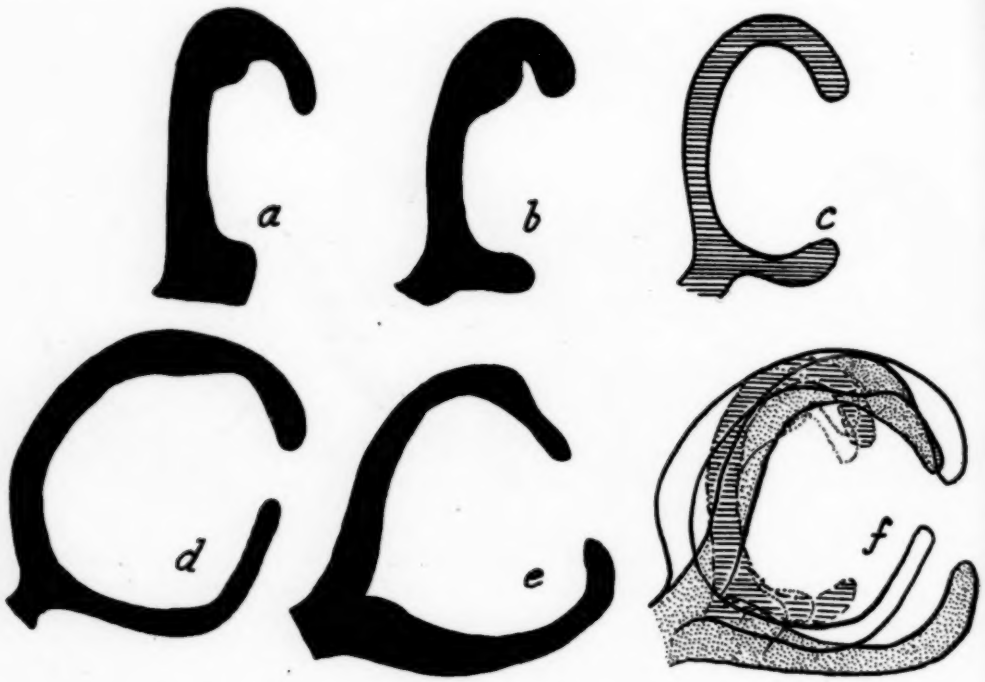

Fig. 7. (Mann.) Five stages (*a*, *b*, *c*, *d*, *e*) in the eye of the chick. Nerve fibers are beginning in *c*. *f* is a composite drawing of them all. Stage *c* is shown with horizontal lines and stage *e* is stippled.

Having traced the increasing importance of the lower retinal region through these various species, it becomes possible to construct a composite diagram showing the phylogenetic increase in this lower region throughout a series of embryos of different species but of the same stage of development of the upper retinal region. Figure 10 represents this. It is obtained by superimposing all the stages

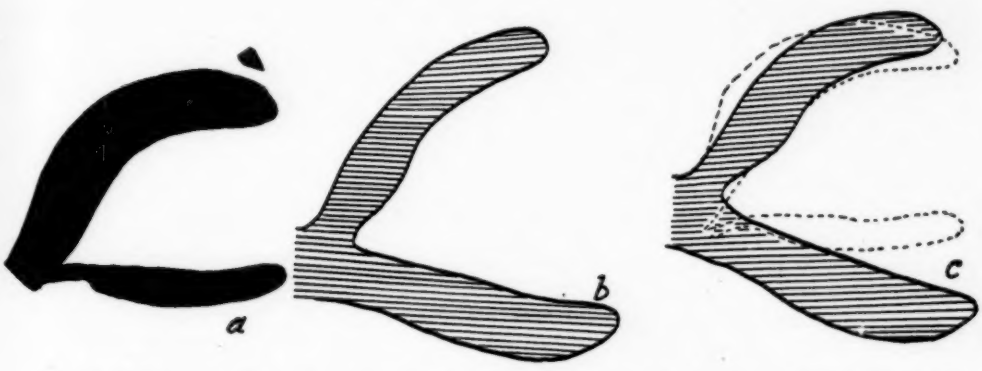

Fig. 8. (Mann.) Two stages, *a* and *b*, in the optic cup of a mouse. Nerve fibers are present in *b*. *c* shows the two stages superimposed.

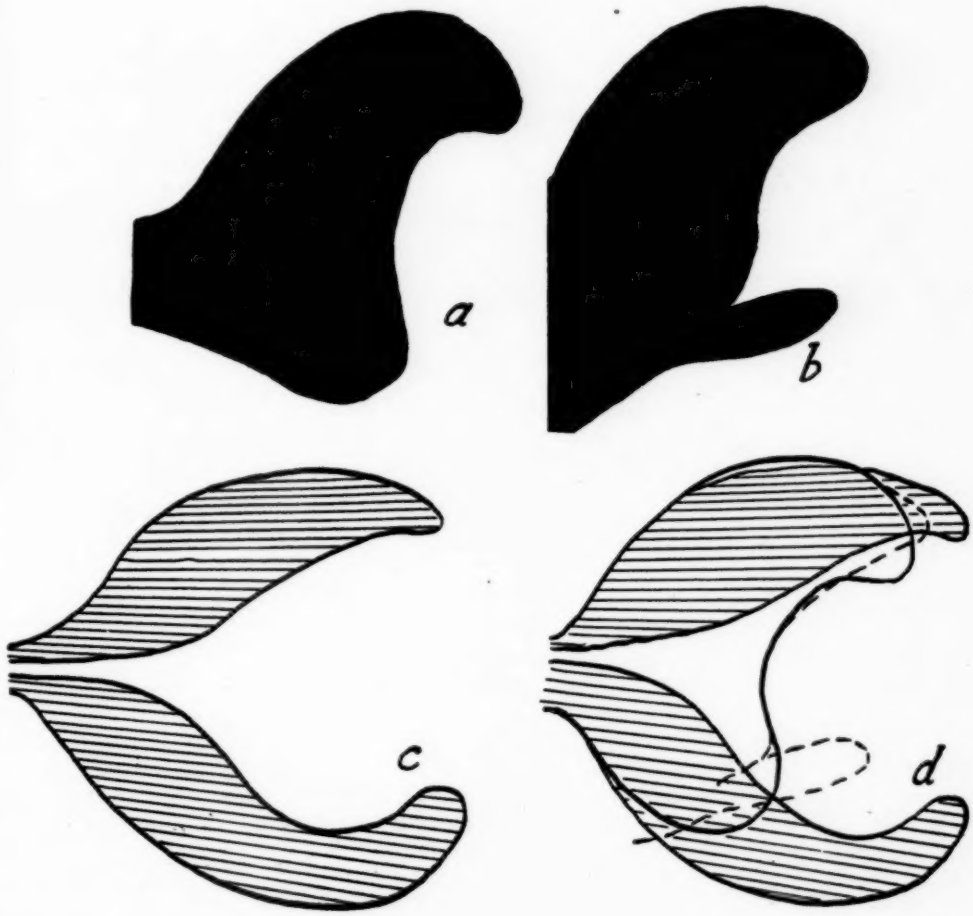

Fig. 9. (Mann). *a*, optic cup of 5 mm. human embryo *b*, optic cup of 7.5 mm. human embryo. *c*, optic cup of 17 mm. human embryo with nerve fibers. *d*, superimposed stages.

from the preceding diagrams which showed the first appearance of nerve fibers above the disc. The result obtained is very similar to the ontogenetic series seen in figure 7.

It is now clear that the upper region shown to exist and will be briefly illustrated by examples.

The normal variations met with in the lower region can best be dealt with by considering the mode of closure of the ocular cleft in different species. In

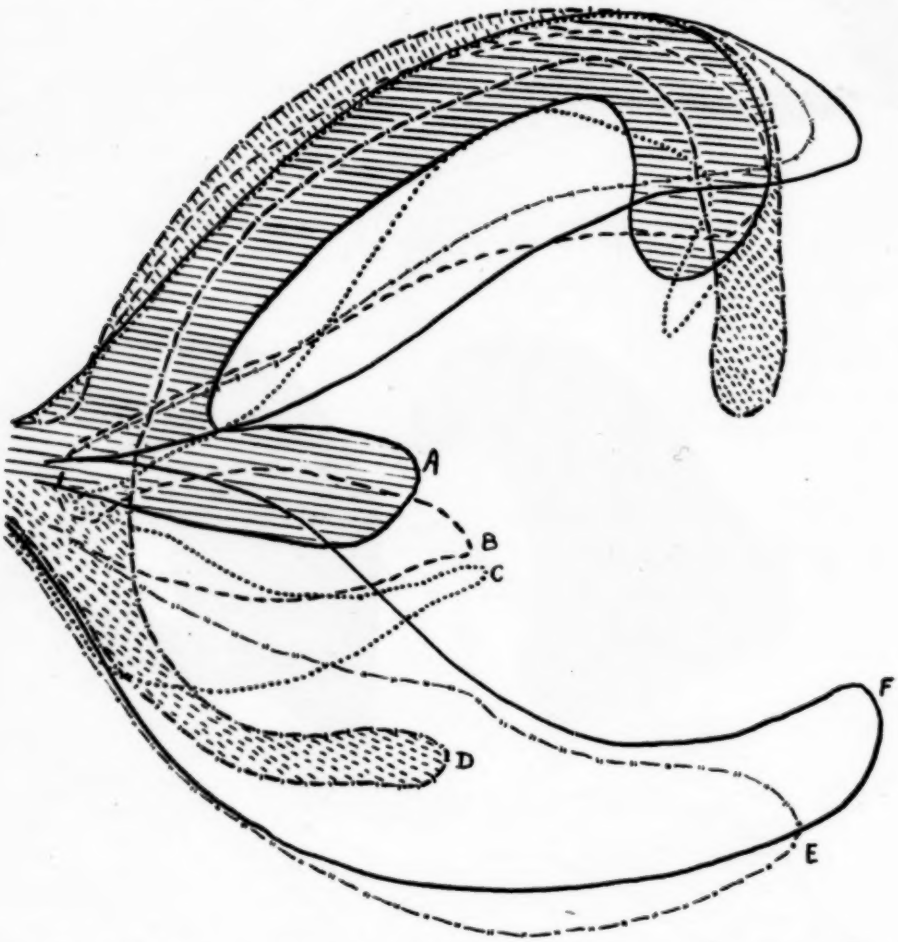

Fig. 10. (Mann.) Diagram obtained by superimposing the shaded sections in figures 2, 5, 6, 7, 8, and 9. *a*, outline of optic cup in Amia. *b*, outline of optic cup in frog. *c*, outline of optic cup in chrysemys. *d*, outline of optic cup in chick. *e*, outline of optic cup in mouse. *f*, outline of optic cup in man. All the sections are at the same stage of retinal differentiation.

can be regarded as old in phylogeny and the lower as new and hence presumably "fluid." This fluidity might be expected to show itself in the presence of variations in the lower part of the eye in different species, and also in the tendency of this region to exhibit sporadic congenital maldevelopments. Both these tendencies can be many the closure is an uncomplicated process, but here and there it is subject to important and profound modifications.

Among the fish themselves there are certain variations. The Ganoids show a simple closure of the cleft. The growth rates of both inner and outer walls of the optic cup are the same,

so that no "buckling" of the inner wall (which is well known in the higher vertebrates) occurs during development. There is therefore no tendency to eversion of the inner layer along the cleft, and once the cleft margins have come into apposition they fuse and no trace of their situation remains. This is probably the primitive condition. The cleft remains open relatively long in Amia calva, and nerve fibers pass out of the eye over a considerable length of it. There is a small amount of vascular mesoderm passing through the fissure and forming a primitive hyaloid artery which soon disappears.

The Elasmobranches resemble the Ganoids in lack of marked specialization, but differ from them in showing a slightly greater rate of growth of the inner than of the outer wall of the optic cup, so that eversion of the inner layer occurs along the fissure and leads to delayed pigmentation on the outside of the optic cup here. There is also a rather greater aggregation of vascular mesoderm between the lips of the fissure than in the Ganoids. The fissure however closes relatively earlier than in them, and nerve fibers only pass out at the extreme upper end of it.

In the Teleosteans we find a marked specialization. The cleft is late in closing and from its margins are developed two structures, the processus falciformis and the campanula Halleri. The former is formed by invagination of a crest-like ridge of mesoderm between the lips of the fissure throughout the greater part of its length, the margins of the fissure being inverted and raised into a ridge on either side of the mesodermal crest. The latter is a curious pyramidal-shaped structure developed at the distal end of the fissure and containing an ectodermal muscle, the retractor lentis, which grows from the wall of the optic cup at the side of the fissure. The campanula is concerned in the mechanism of accommodation in Teleosteans. It does not appear to occur in any other species. The processus falciformis is a nutritional organ suggesting the pecten of Sauropsida but not developed in the same way and therefore not strictly homologous.

Among **amphibia** the process of closure of the cleft and growth of the lower part of the cup is simple and unmodified, and resembles that found in the Ganoids save that the cleft usually closes relatively earlier.

Among the **reptiles** however we find the beginning of an important specialization which reaches the height of its development in birds. In Chelonia the process is only just beginning and is exemplified by the presence of a large and rather thick-walled vessel projecting from the center of the disc, and by the tendency to eversion of the inner layer of the optic cup along the edges of the cleft. In Lacertilia the eversion is more apparent and the vessel on the disc is accompanied by the outgrowth of a cone of glial tissue from the center of the disc into the vitreous. This cone-shaped process subsequently becomes vascularized by branches from the base of the hyaloid vessel and develops into the pecten (a structure which in most Sauropsida, from a nutritional point of view, takes the place of the arteria centralis retinæ of higher animals and of the processus falciformis of Teleosteans). The eversion of the inner wall of the cup along the upper part of the fissure supplies a path for issuing nerve fibers and leads to the appearance of a bundle of these outside the eye. In lizards this is insignificant but in birds it develops into the cauda of the optic nerve.

In **birds** the line of development of the fissural structures is merely in the direction of further elaboration of the condition found in lizards. The pecten is larger, is more elaborate, and involves a much greater length of the upper part of the fissure. Its ectodermal component is developed from the "new" retina bounding the cleft. The cauda (developed from the everted area of the inner wall of the cup) is, as mentioned above, a large and important structure in birds.

In **mammals** we have, coincidentally with a rapid appearance of the "new" retina, a correspondingly rapid closure of the cleft, so that there is no time for the elaboration of structures from its margins. All trace of the cleft disap-

pears in man save the passage for the arteria centralis retinæ through the nerve head, and the condition of the new retina comes to resemble, from the absence of specialization, that found in the primitive Ganoid, though in the size of the region and its early appearance it differs strongly from this.

Hence, throughout the vertebrates, we see that variations of structure often arise but are always associated with the new retina and never involve the region above the optic disc.

With regard to the occurrence of congenital malformations of the retinal regions, although it is not possible to lay down such a hard and fast rule, it is easy to see that a very large majority of the commoner malformations do involve the region of the fissure. In man the conditions of inferior crescent, partial and complete typical coloboma of choroid retina and disc, staphyloma of von Ammon, and typical coloboma of the iris and ciliary body (all of which involve the lower part of the optic cup) are of much more common occurrence than are the atypical appearances of clefts and patches of aplasia which are occasionally found above the optic disc.

Summary

1. The main processes involved in the development of the eye are similar in all vertebrates. This is especially exemplified in the differentiation of the layers of the retina.

2. Certain modifications of structure occur in different species, but in every case these can be shown to involve the region of the retina below the optic disc.

3. The upper region of the retina can therefore be considered as "stable" in phylogeny, the lower as "fluid."

4. By a study of the development of the "fluid" region in early embryonic life it can be shown that both ontogenetically and phylogenetically it is younger than the upper "stable" region. This is in accordance with its known variability.

5. The region of the retina above the disc is phylogenetically old and specialized and that below is still primitive and variable. This is true even in human ontogeny, the number of sporadic congenital malformations involving the lower part of the eye being much greater than the number occurring above the disc.

PRELIMINARY REPORT UPON EXPERIMENTAL INVESTIGATION AS TO PRESENCE OF TREPONEMA PALLIDUM IN LUETIC INTERSTITIAL KERATITIS

C. A. CLAPP, M.D., F.A.C.S.

BALTIMORE

In rabbits, an interstitial keratitis resulted from intraocular or subconjunctival injections of treponema pallidum. Some doubt existed as to whether the treponema was demonstrable in sections of the diseased cornea. These experiments were carried on at the Brady Institute. Read before the ophthalmological section of the Baltimore City Medical Society, February 23, 1928.

In 1857 Hutchinson[1] called attention to the probability that interstitial keratitis was caused by syphilis. The isolation of the treponema added new interest to the question. More recently the query has arisen as to whether the corneal infiltration is a direct invasion of the cornea by the treponema or evidence of an allergic reaction. Both theories have a number of ardent advocates. The purpose of our experiments was to verify one or the other of the above theories as to the presence or absence of treponemata in the cornea in interstitial keratitis.

In 1922 Igersheimer[2] published his results showing the presence of the treponema in the corneal tissue in experimental syphilis. He seemed to be able to demonstrate rather conclusively that rabbits which developed metastatic keratitis following a testicular inoculation showed the treponema in the corneal tissue. The rabbits which received more direct inoculations either into the anterior chamber or into the vitreous, and which subsequently developed keratitis, also showed the presence of treponemata.

Collins and Mayou[3] state that treponemata have never been found in the cornea of interstitial keratitis, but von Hippel[4] reports a fetus of thirty-three weeks that showed treponemata in the cornea, and Igersheimer[5] reports a child of fourteen years with positive Wassermann from whose eyes an excised piece of cornea showed the presence of treponemata. Others have demonstrated the treponema in the corneas of premature syphilitic children. Bertarelli[6], Greef and Clausen[7], and others have demonstrated it in the cornea of rabbits directly infected.

Löwenstein[8] claims that spontaneous keratitis often develops in rabbits which have had testicular inoculations (six to eight months). In luetic rabbits a keratitis may be started by intracorneal injection of normal serum, by incision of the conjunctiva, or by cutting the superior rectus muscle and its vessels. Microscopical studies showed round cell infiltration, mostly around the anterior ciliary vessels. Löwenstein found similar changes in human congenital lues with interstitial keratitis. He therefore believes that these round cells lead to obstruction of the anterior ciliary vessels, with subsequent necrotic changes in the corneal tissue. His opinion is that the keratitis is not due to the treponema, but to this disturbance of nutrition. Jaeger[9], on the other hand, studied an eye of a twenty-one year old patient with acute interstitial keratitis, who died rather suddenly from grip, and he was unable to find the treponema in sections. Spicer[10], in his recent monograph, states that the treponema has not been found in the human cornea, but he believes that regardless of this the keratitis is due to the presence of the treponema, which has remained there from fetal life and which develops only when conditions are favorable.

Our experimental work was done entirely upon rabbits. Six series have been utilized. The first series consisted of four rabbits, into whose hearts we injected one c. c. of a testicular emulsion from an actively luetic rabbit. This group of rabbits was observed for three months without the occurrence of ocular lesions. The activity of the emulsion used was tested by testicular inoculation of other rabbits, who showed a positive take.

Of the second group of four rabbits, three received the injection into the anterior chamber and one into the ciliary region. After subsidence of an acute reaction which was accompanied by iritis and which lasted about one week, the eyes of all four remained white from five to six weeks, when they began to show circumcorneal injection and rapidly developed well marked interstitial keratitis. It was evident in this case that the eye which received the injection into the ciliary region passed through the same course as those which received the injection into the anterior chamber. Two of the rabbits, one having an anterior chamber inoculation and the one receiving the ciliary region injection, were sacrificed at the end of four weeks, while the keratitis was at its height, and were studied microscopically. The other animals were treated with flumerin. No reaction could be detected at the end of three months, after which time the eyes were examined microscopically. The results of the examinations of the two groups of this series will be found in Chart 1.

The colored drawing reproduced in the frontispiece to this issue of the American Journal of Ophthalmology is from rabbit number 450, and shows well marked typical interstitial keratitis extending beyond the center of the cornea, with vessels entering the substantia propria above.

CHART 1. (Clapp)

Number	Dose	Site of injection	Duration primary iritis	First sign of keratitis	Treatment	Result	Pathological report
409	0.5 c. c. emulsion	Right anterior chamber	6 days	45 days	8 doses flumerin after three months	Eye quiet after four months. Small opacity	Round cell infiltration in superficial layers. Treponemata not found.
410	1 c. c. emulsion	Right anterior chamber	8 days	41 days	8 doses flumerin after three months	Eye quiet four months after inoculation	Moderate cellular infiltration in substantia propria. Treponemata not found.
411	0.5 c. c. emulsion	Right anterior chamber	6 days	49 days	No treatment	Rabbit sacrificed 29 days after keratitis	Cornea thickened. New vessels in cornea. Large cells between layers. Numerous eosinophiles. Treponemata questionable.
412	0.5 c. c. emulsion	Right ciliary region	1 month	35 days	No treatment	Rabbit sacrificed 27 days after keratitis	Slight cellular infiltration at limbus. No large cells in spaces. Treponemata demonstrated?
338 348	Both rabbits received testicular inoculation, with positive take.						

In the third series five rabbits and control were used. The results were most unsatisfactory. Four received bilateral anterior chamber inoculations and one received a vitreous inoculation. One rabbit of the four developed a keratitis in one eye. Two of the rabbits showed no evidence of keratitis. The fourth rabbit died, as did the one which received the vitreous injection. No conclusions could be drawn from this series. The microscopical findings are shown in chart 2.

CHART 2. (Clapp)

Number	Dose	Site of injection	Duration primary iritis	First sign of keratitis	Treatment	Result	Pathological report
433	0.2 c. c. emulsion	Both anteriors chamber	12 days	Right eye negative Left eye 60 days later.	None	Cloudy cornea. Sacrificed after 5 months.	Round cells and leucocytes at site of keratitis.
434	0.2 c. c. emulsion	Both anterior chambers	12 days	No keratitis after four months	None		Eyes not sectioned.
435	0.2 c. c. emulsion	Both anterior chambers	17 days	None	None	Rabbit died 18 days after inoculation	Exudate into anterior chamber with edema of left iris.
417	0.2 c. c. emulsion	Both vitreous bodies		None	2.5 c. c. of 5% mercurochrome in heart	Large opacities in vitreous. Rabbit died after twenty three days.	Eyes showed exudate into vitreous, with detachment of retina in left.
439	0.2 c. c. emulsion	Both anterior chambers	7 days	No keratitis in either eye		"	
432	Testicular control showed typical lesion.						

CHART 3. (Clapp)

Number	Dose	Site of injection	Duration primary iritis	First sign of keratitis	Treatment	Result	Pathological report
434	0.2 c. c. emulsion	Both anterior chambers	14 days	O. D. 61 days. O.S. none	None	Slowly clearing	Eyes were lost
439	0.2 c. c. emulsion	Both anterior chambers	Eyes infected	None	None	Staphyloma of cornea	Diffuse purulent keratitis, iritis and hypopion
438	0.2 c. c. emulsion	Both anterior chambers	7 days	None	None	Died of pneumonia	
441	O.D. 0.1 c. c. O.S. 0.2 c. c. emulsion	O.D. cornea O.S. anterior chamber	7 days	None	None		
437	0.2 c. c. emulsion	Both anterior chambers	12 days	None	None		

CHART 3 *continued.* (Clapp)

440	0.2 c. c. emulsion	Both anterior chambers	O.D. 14 days. O.S. 7 days	None	None		
446	0.2 c. c. emulsion	Both anterior chambers	7 days	None	None		
447	0.15 c. c. emulsion	Both anterior chambers	7 days	None	None		
451	0.2 c. c. emulsion	Both anterior chambers	14 days	None	None		
452 Brown	0.2 c. c. emulsion	Both anterior chambers	7 days	None	None		
452 White	0.2 c. c. emulsion	Both anterior chambers	7 days	None	None		
443	Positive testicular inoculation.						

Series four, chart three, including eleven rabbits and control, received bilateral anterior chamber inoculations of one-fifth c. c. emulsion, except number 441, which received in the right cornea and the left anterior chamber inoculations of one-tenth and one-fifth c. c. respectively. All developed a primary iritis lasting from seven to fourteen days, except number 439, whose eyes became infected, with resulting purulent keratitis and later a staphyloma of the cornea. None of the other eyes developed typical interstitial keratitis, consequently they were not studied microscopically.

Series five, consisting of five rabbits and controls, received one-fifth c. c. bilateral anterior chamber inoculations of an emulsion contaminated with bacteria. Each eye showed infection, with violent reaction. One animal that received an anterior chamber inoculation and both of the control animals died. The microscopical findings of this series were those of purulent keratitis as tabulated in chart 4.

CHART 4. (Clapp)

Number	Dose	Site of injection	Duration primary iritis	First sign of keratitis	Treatment	Result	Pathological report
447	0.2 c. c. emulsion	Both anterior chambers	Violent reaction. Infection.	Followed infection	None	Died 11 days later.	O.D. picture of purulent keratoiritis. O.S. cornea much thickened and infiltrated.
452 White	0.2 c. c. emulsion	Both anterior chambers	Violent reaction. Infection.	Followed infection	None	Staphyloma of cornea	Purulent keratitis with marked thinning.
451	0.2 c. c. emulsion	Both anterior chambers	Violent reaction. Infection.	Followed infection	None	Staphyloma of cornea	Staphyloma of cornea following infection.

CHART 4 *continued.* (Clapp)

452 Brown	0.2c.c. emulsion	Both anterior chambers	Serve reaction. Infection.	Followed infection	None None	Staphyloma of cornea	Large exudate into anterior chamber. Thinning and bulging of cornea.
434	0.2 c. c. emulsion	Both anterior chambers	Infection	Followed infection	None	Leucoma of cornea	Exudates into anterior chambers. Purulent keratitis.
432 433	Testicular control produced mar reaction and death of animals.						

The sixth group of four rabbits seems to be instructive as to developing a method of inoculation that will prevent losing eyes from bacterial contamination. The first two rabbits were given the inoculation subconjunctivally, and in each case a keratitis cornea. The microscopical examinations of sections stained by Levaditi's method, especially from those animals sacrificed in the acute stage, showed bodies which we were convinced were treponemata, but the same specimens were later examined by a syphilologist,

CHART 5. (Clapp)

Number	Dose	Site of injection	Duration primary iritis	First sign of keratitis	Treatment	Result	Pathological report
450	0.2 c. c. emulsion	Subconjunctivally, above O.D.	None	41 days	None	Sacrificed after 5 months	O.D. few cells on Descemet's membrane. Few vessels in substantia propria. No treponemata found.
453	0.2 c. c. emulsion	Subconjunctivally, above O.D.	None	38 days	None	Sacrificed after 5 months	New vessels near "Bowman's" membrane. Cells more numerous. No treponemata demonstrated.
449	0.2 c. c. emulsion	Anterior chamber O.D.	Panophthalmitis 5 days		None	Sacrificed after 5 months	Vitreous filled with purulent mass which has involved surrounding tissues.
451	0.1 c. c. emulsion	Vitreous O.D.	Panophthalmitis 7 days		None	Sacrificed after 5 months	Eyes not saved.
454 459 460	All showed positive inoculation.						

of the interstitial type developed in about forty days. One of the other rabbits was inoculated into the anterior chamber and the other into the vitreous, with the result that each developed panophthalmitis. The microscopical findings are shown in chart 5.

Our experiments up to the present have been disappointing in regard to a positive knowledge of the presence or absence of treponemata in the who gave an opinion that these bodies were not treponemata but artefacts. In view of these conflicting opinions we do not feel that the question has been proven, however the following interesting observations were made:

(1) That injections of treponemata into the anterior chamber or ciliary region will set up an interstitial keratitis in about six weeks.

(2) That subconjunctival inocula-

tion seems to be just as efficacious as intraocular injection.

(3) That emulsions should not be made from testicular lesions having an ulcerated area, even if the ulcerated portion is removed, as such emulsions show bacterial contaminations.

(4) That the keratitis does not necessarily start at the point of injection, but may first appear at any point, even on the opposite side from the injection.

(This experimental work has been done in the Brady Institute in conjunction with Miss Hill, whose interest and helpful suggestions are greatly appreciated.)

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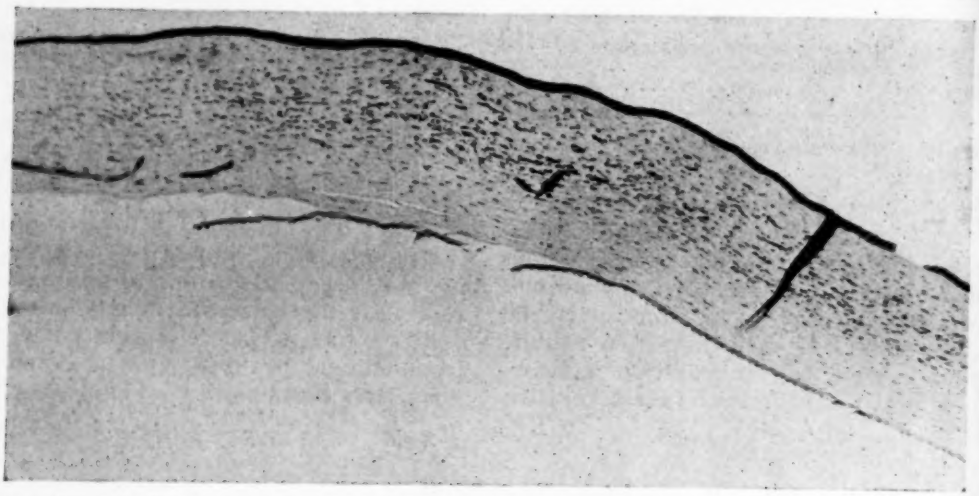

Fig. 1 (Clapp). Low power (50) photomicrograph of cornea with interstitial keratitis, showing marked cellular infiltration into substantia propria.

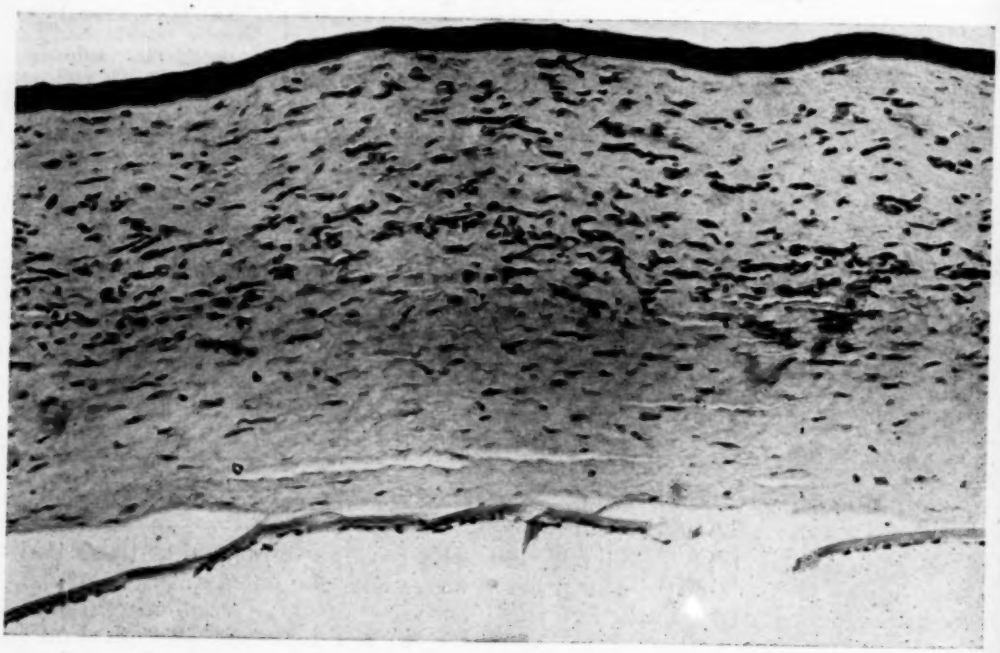

Fig. 2 (Clapp). High power (120) photomicrograph of same area.

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TUBERCULOSIS OF THE CONJUNCTIVA

ELIZABETH BARTOS, M.D. AND M. PAUL MOTTO, M.D.

CLEVELAND

The tuberculous lesion appeared as a deep area of necrosis on the conjunctival surface of the upper lid, involving the tarsus. Tularemia was ruled out. An abscess developed in the preauricular lymph gland. Guinea pigs inoculated from the palpebral lesions developed generalized tuberculosis, and biopsy of the palpebral lesion showed the definite histological picture of tuberculosis. From the ophthalmic division of the Lakeside Hospital and from the Babies' and Children's Hospital.

Because of its comparative rarity and the fact that it is often confounded with trachoma and Parinaud's conjunctivitis, we feel that the following case of tuberculosis of the conjunctiva is worthy of presentation.

Before going at length into the report of this case it seems proper to set forth a few salient features regarding tubercle of the conjunctiva.

Parsons (Diseases of the Eye, page 178) gives the following forms: (1) small miliary ulcers usually on the palpebral conjunctiva; (2) granules on the palpebral conjunctiva resembling trachoma follicles; (3) gelatinous cockscomb-like excrescences on the fornices; (4) polypoid pedunculated outgrowths. "The conjunctiva may be affected by extension of lupus from the face."

With the several types of tuberculous conjunctivitis, the features beside those enumerated are swelling of lids, especially the upper, pain and considerable enlargement of the preauricular and neighboring glands, which may go on to suppuration. The disease is chronic, the patients young and generally free from clinical tuberculosis elsewhere in the body.

Our case is a combination of forms one and two, and was seen by one of us (Motto) in the Outpatient Department of the Lakeside Hospital on the Ophthalmic service of Dr. Roy B. Metz. The patient J. O., male aged nine years, was admitted December 28, 1926. Complaint: "sore left eye". Past history and family history negative.

Present illness. Onset one month ago, when he was hit with the hand by another boy, just in front of the left ear. Since then there has been swelling at the site of injury which has been growing larger, and he has noted that the left eye has been red and painful. Also, there has been a moderate discharge from the eye.

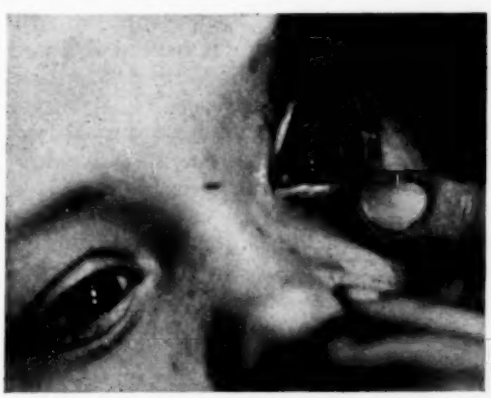

Fig. 1. (Bartos and Motto). Ulcerated area involving palpebral conjunctiva and tarsus, December 30, 1926.

Examination showed the following: V.O.D.=6/6. V.O.S.=6/6. Right eye normal in every respect. Left eye, moderate drooping of the upper lid, which is somewhat swollen and red. The lids are considerably thickened, and the palpebral conjunctiva presents a velvety, red appearance. Covering the palpebral conjunctiva is a thin, somewhat greyish membrane, which on removal leaves a bleeding surface. In the outer third of the palpebral conjunctiva of the upper lid, there is an irregular area of necrosis about one cm. in diameter from which exudes a purulent secretion.

The involved area appears deep, affecting the tarsus proper, but does not extend beyond the retrotarsal fold. The remaining palpebral conjunctiva of the upper lid as well as the lower palpebral conjunctiva is covered with many irregular, well formed, yellowish, pointed follicles. There is a slight mucopurulent secretion present in the lower cul-de-sac. The retrotarsal fold does not appear to be involved. The ocular conjunctiva is slightly injected. The cornea is clear, the pupil is round and equal to that of the right, and reacts to light and convergence. Fundus, tension, and muscle movements are normal. The preauricular and parotid glands are moderately swollen, and sensitive to palpation.

A tentative diagnosis of Parinaud's conjunctivitis was made, and smear and cultures were taken, blood Wassermann ordered, and blood serum sent to the U. S. Hygienic Laboratory, to rule out tularemia. The treatment ordered was: (1) mercurochrome 1% gtt. j. t.i.d.; (2) hot compresses, q. 4 h. for twenty minute periods. Two days later the ulcerated area on the palpebral conjunctiva showed a definite extension. The edges were rough and irregular and extended into the tarsus proper. The follicles show no noticeable change.

At each visit of the patient, the temperature was taken and an elevation was noted, the readings never going below 37° C. or reaching beyond 37.8° C. January 4, the swelling over the preauricular region was more conspicuous, and for the first time a definite fluctuation was noted. The patient was referred to the surgical department, where the tumor mass was incised and drained. Six c. c. of purulent contents were evacuated from the abscess. During the next ten days the appearance of the tarsal conjunctiva showed no marked change, the follicles remaining about the same. The ulcerative area was considerably contracted.

From January 15 to 25, the patient was in quarantine because of scarlet fever contact made by the family. On the latter date the eye showed no marked change from that observed on previous examination. However, there was still present a prominence of the parotid region and the cervical glands were enlarged.

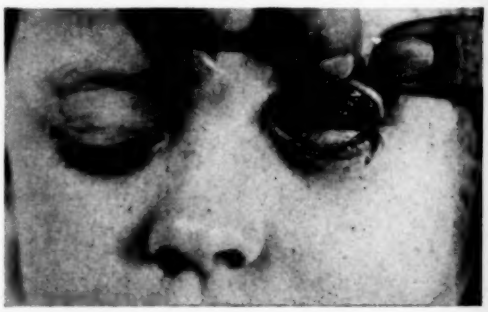

Fig. 2. (Bartos and Motto). Appearance of lesion after local treatment, March 2, 1927.

The patient next put in an appearance February 12, 1927, the mother stating that he had again been quarantined because of scarlet fever in the family. Examination of the eye showed the upper lid to be thickened, and at the middle third there was a tumor-like mass about two cm. in diameter. The involved area was yellowish in color and gave the impression of a small abscess. The palpebral conjunctiva of the upper lid showed increased folliculosis, and the ulcerated area showed no great change except that there was no further extension. The follicles on the lower palpebral conjunctiva were stationary. The preauricular gland was as previously seen.

The abscess on the upper lid was incised and drained, the contents evacuated being purulent in nature. A sterile dressing was applied, and the patient admitted to the Babies' and Children's Hospital, February 13, 1927.

Laboratory findings at Lakeside Hospital previous to admission of the case to the Babies' and Children's Hospital were as follows: (1) Repeated examination from time to time of smears from eye showed no organisms. (2) First cultures from eye showed diphtheroids. (3) Later cultures taken from eye, and pus from incised gland, showed Gram-positive organisms, ranging from cocci to plump rods. They were very slow-growing and did not subculture successfully: Loeffler's and acetic glucose bouillon produced most satisfactorily. (4) Organisms inoculated into guinea pigs after prolonged cultivation on artificial media produced no apparent pathological condition. (5) Patient's serum sent to U. S. Hygienic Laboratory for agglutination test was negative for tularemia. (6) Blood Wassermann negative.

Admission findings at the Babies' and Children's Hospital: Lesion on left upper lid as described above, preauricular swelling, with recent incision draining moderate amounts of pus. Tuberculin reaction very markedly positive (dilution 1 to 1000) with severe general reaction (temperature 39.8). No focal reaction. X-ray of chest gave no evidence of pulmonary pathology. That of the sinuses showed slight clouding of the right antrum. Blood hemoglobin 80 per cent. White blood cells 15,000.

February 29, 1927, scrapings were taken from the lesion and inoculated into a guinea pig. The pig was sacrificed on May 20, 1927, and showed generalized tuberculosis. In another pig injected with pus from the preauricular abscess generalized tuberculosis also developed.

March 9, 1927, biopsy was done on the left upper lid, and the ulcer was found to have extended through conjunctiva and tarsus and posteriorly to the retrotarsal fold. A section of the lesion was removed (see pathological report). A guinea pig was injected, and showed generalized tuberculosis at autopsy.

May 21, 1927, the palpebral and ocular conjunctiva of a rabbit's eye were scarified and inoculated. The eye showed no definite evidence of tuberculosis. The result of this experiment was the formation of many irregular well developed follicles not unlike those found in the patient except that they presented a grayish hue.

A definite phlyctenule was noted which went on to the development of a typical fascicular keratitis. This condition was difficult to photograph, so that it could be demonstrated, but at the suggestion of Mr. Shields a photograph was made by him after well staining the involved area with mercurochrome.

The patient's blood count on several occasions showed 14,300 to 16,250 white cells. The differential count showed, on several occasions, polymorphonuclears from 45 to 52 per cent, lymphocytes 20.7 to 44 per cent, mononuclears 4 to 4.8 per cent, and eosinophiles 1.3 to 6.2 per cent. The temperature while in the hospital showed a daily rise to 37° or 38° C.

General treatment included (1) ultraviolet rays, (2) concentrated S.M.A., (3) high caloric diet. Local treatment consisted of (1) 1 per cent $AgNO_3$, (2) later lactic acid 50 per cent, (3) picric acid 4 per cent, (4) boric flush. The eye condition improved slightly, as did also the general condition. April 4, 1927, the patient was transferred to the Rainbow Convalescent Hospital, where he remained until September 2, 1927.

At the time of his discharge from the latter institution, the patient was without fever, and weighed 59.5 pounds, slightly above normal for his age. The eye was quiescent, the palpebral fissure practically equal to that of the left eye, and a slight arching of the lid margin remained. The connective tissue changes at the site of the lesion were not marked, and the surface was quite smooth. The preauric-

ular region had returned to normal, and only a small cicatrix was noticeable at the site of the incision. The patient was seen last on November 25, 1927, when the eye was quiet and the physical condition remained good.

The following is the **pathologic report** as submitted by Dr. Harry Goldblatt, assistant professor of pathology in the School of Medicine, Western Reserve University:

Clinical diagnosis, Parinaud's conjunctivitis. Nature of specimen, biopsy from upper lid, conjunctiva, and tarsus. Gross description: The specimen is a small tag of firm tissue about 1 cm. by 3 mm. by 2 mm.

Histological examination: The sections stained with hematoxylin-eosin show many foci of necrosis surrounded by epithelioid cells and giant cells, both of the foreign body and Langhans type. Surrounding this zone are many lymphoid cells and some adult connective tissue cells. In some areas there are small nodules which consist entirely of epithelioid cells and are surrounded by a zone of lymphoid cells. Sections were stained for tubercle bacilli by the Ziehl-Nielsen method and careful search for tubercle bacilli made. In one section, several red staining bodies of the size and shade of tubercle bacilli were seen, but no definite diagnosis of tubercle bacilli is made because these are the only suggestive bodies seen in all the sections examined. However, histologically, the picture is definitely that of tuberculous tissue.

Diagnosis: tuberculous conjunctivitis.

Conclusions

This case of tubercle of the conjunctiva is presented because of its great rarity. Clinically it had all the characteristics of a Parinaud's conjunctivitis. Tularemia was also under consideration, but was ruled out by two negative blood serum reports from the United States Hygienic Laboratory, Washington, D.C.

The case was definitely proved to be tuberculous by histological examination of biopsy of the lesion, and by guinea pig inoculation, which later showed generalized tuberculosis at autopsy. The tuberculin reaction was definitely positive, and there was a general but no focal reaction. Inoculation of palpebral and ocular conjunctiva of a rabbit's eye resulted in a condition which moderately simulated that found in the patient. However, it more clearly resembled the ocular disturbance known as eczematous keratoconjunctivitis, which we frequently attribute to the possible tuberculous origin.

Finally, from a thorough perusal of the literature we suspect that many cases which are diagnosed as typical Parinaud's are tuberculous, and would be proved so if followed out and investigated in the manner indicated in our report.

In closing the report of this very instructive and interesting case, we wish to acknowledge our deep appreciation and thanks to Professor Henry J. Gerstenberger, director of the Babies' and Children's Hospital, and his staff for their kindly cooperation and assistance in making this presentation possible. To Dr. R. B. Metz of the Ophthalmic Division of the Lakeside Hospital we are also indebted for the privilege of reporting this case.

13002 Buckeye road (Dr. Bartos)
550 Rose building (Dr. Motto)

SURGICAL SUGGESTIONS AS TO INDIVIDUAL PARALYSIS OF THE OBLIQUE OCULAR MUSCLES

JOHN MONRO BANISTER, M.D., F.A.C.S.

OMAHA

In the presence of paralysis of an oblique muscle, the writer questions the wisdom of correcting the deficiency by tenotomy of a vertical rectus of the other eye. For paralysis of the superior oblique he would advance or tuck the inferior rectus of the affected eye, and where the inferior oblique is paralyzed he would subject the superior rectus of the same eye to this treatment. Prisms may be used for any residual lateral diplopia.

Owing to the anatomical relations of the superior and inferior oblique muscles to the eyeball, their deep location in the orbit, and their attachments to the globe in the neighborhood of the equator, any special procedure of a surgical character directed to the paralyzed obliques themselves, in the nature of an advancement, or shortening by tucking, is out of the question.

In attempting to relieve the distressing diplopia in such instances of paralysis the ophthalmic surgeon must make use of other muscles, the recti, bearing in mind their physiological relationship to the paralyzed muscles, and their own definite functions in the combined, harmonious movements of the globes.

In this connection the physiological relationships of the oblique muscles to their contralateral yoke-fellows of the other eye are most important. These yoke-fellows are the superior oblique muscle of each eye and the inferior rectus of the opposite eye—the inferior oblique of each eye and the superior rectus of the fellow globe. These pairs of muscles are closely linked functionally in every movement of the eyeballs.

In cases of paralysis of the superior or inferior oblique of either eye the diplopia resulting may possibly be relieved by weakening the action of the inferior or superior rectus of the other eye, respectively, by setting back these muscles by tenotomy, thus causing the images of the two eyes to occupy approximately similar positions, and thus rendering fusion possible.

The diplopia in the case of oblique paralysis is homonymous, as the oblique muscles are abductors. This weakening of the appropriate contralateral rectus muscle by a complete tenotomy has been the universally approved method of attempting to relieve the diplopia in oblique palsies. The practical disadvantage of such procedure is a distinct limiting of the lower visual field in paralysis of the superior oblique with tenotomy of the contralateral inferior rectus, and a similar curtailment of the upper visual field by a setting back of the superior rectus of the other eye in instances of paralysis of the inferior oblique.

Operative modifications suggested: The writer has of late been seriously questioning the wisdom of curtailing the motility of a healthy eye to make up for the deficiencies of a paretic one. Why not attack the paralyzed eye and, by surgical measures directed to the recti of that eye, bring the latter into more natural relations with the other or properly directed globe? Thus in cases of paralysis of the superior oblique, the eyeball is misdirected upward and inward, and in order that the vertical diplopia may be corrected (the false image being below and to the outer side of the true image), the cornea must be pulled downward to the proper degree to place the two images on a horizontal level. This can be accomplished by an advancement, or tuck shortening, of the inferior rectus muscle of the affected eye. The effect secured must be sufficient to relieve the vertical deviation, and this must be verified at the operating table.

In the case of isolated paralysis of the inferior oblique, which is a rare affection, a similar treatment is advisable, in this instance the advancement or tucking being applied to the superior rectus of the same eye.

Landolt alone has advised the advancement of the inferior rectus muscle of the affected eye in cases of paralysis of the superior oblique. He, however, does not seem to have recommended a similar procedure upon the superior rectus in paresis of the inferior oblique. This would appear to be equally advisable and practicable. The writer is not aware that this authority has called attention to the homonymous lateral diplopia liable to remain after the leveling of the globes has been secured. This is due to the loss of general abductive power owing to the oblique paralysis, both the superior and inferior oblique being abductor muscles.

Such lateral homonymous diplopia, if of a marked degree, can very easily be corrected by an advancement of whatever type, or a tucking, of the external rectus of the same eye, which muscle may not be able to secure the proper amount of abduction of the globe without the increase of power so obtained. In slight degrees of such diplopia remaining after the eyeball has been brought into the proper vertical relationship with the sound eye by attention to the superior or inferior rectus, as the case may be, by means of advancement or tucking, single vision may be secured to a useful degree by the use of adductive prisms, up to three degrees base out, before each eye. For a greater degree of lateral deviation the more radical treatment will be required.

In May, 1926, the writer treated a patient with the most distressing diplopia, resulting from paralysis of the superior oblique, by a tucking of the inferior rectus of the affected eye and giving prisms (three degrees base out, before each eye) to be worn as spectacles. Single vision for a large and useful field was secured, and the condition has remained constant to the great relief of the patient, as the author has just been informed by the oculist who referred the case. The advised utilization of the recti of the affected eye in oblique palsies to secure relief from the disqualifying diplopia certainly appears to be more rational and philosophical than the weakening of the contralateral recti of the sound eye, with the resulting interference with the harmonious muscular coordination of the latter, and the consequent vertical curtailment of the visual fields.

From many years of experience in operating upon the superior and inferior recti muscles in cases of hyperphoria of appropriate degree, and in instances of hypertropia and hypotropia, both comitant and paralytic, the writer is confident of the practical utility of the method proposed. He would advance the following clinical propositions:

(1) In cases of paralysis of the oblique muscles, limit the surgical interference to the recti muscles of the affected eye.

(2) In instances of paralysis of the superior oblique, advance or tuck the inferior rectus of the affected eye sufficiently to bring this eye on an exact level with the fellow organ when looking straight ahead, thus relieving the vertical diplopia.

(3) Where the inferior oblique is involved, subject the superior rectus of the same eye to the same treatment.

(4) When after such procedure, in either case, there remains a lateral homonymous diplopia, which may be expected as a rule, correct this defect by an advancement or tucking of the externus of the same eye where the deviation is more than six degrees (prism). Where the deviation is equal to or less than this amount in prism degrees, use may be made of prisms of the proper degree, bases out, divided between the eyes, to be worn constantly.

920 Medical Arts building.

MILK INJECTIONS IN GONORRHEAL OPHTHALMIA

IRVING I. MUSKAT, M.D.

CHICAGO

The general subject of the therapeutic use of parenteral milk injections is reviewed as regards rationale of foreign protein reactions, dosage, contraindications, general reaction, focal reaction, and immunological reaction. Six cases are reported in which, sometimes after failure of other lines of treatment, rapid recovery from gonorrheal ophthalmia was induced by parenteral milk injections. Read before the Chicago Ophthalmological Society, March 19, 1928.

Introduction: The successful use of parenteral milk injection in disease dates back to 1916, when Schmidt[1] and Saxl[2] injected cow's milk intramuscularly to induce a protein reaction. Since that time a tremendous amount of work has been done in gonorrheal ophthalmia and a great variety of substances have been used in this and other conditions of the eye. Those substances which have acquired some popularity are diphtheria antitoxin, normal horse serum, autohemic serum, casein, typhoid and colon vaccines, egg albumin, proteoses, peptones, and albumoses. Szily[3] used huge doses of gonococcus vaccine (arthogen) in the abortive treatment of gonorrheal ophthalmia, but it was not until the work of Müller[4] that much interest was shown in this type of therapy by others. Heineman and Wilke[5], Igersheimer[6], Jickeli[7], Nussbaum[8], Liebermann, Jr.[9], Purtscher[10], Pillat[11], Müller[12], Bachstez[13], Lindner[14], and others used similar therapy with marked success.

The rationale of milk: Of all the nonspecific proteins that have been used, milk has proved the most efficacious and practical. Vaccines, diphtheria antitoxin, casein, and other substances have been used on the assumption that their dose and reactions could be standardized. However, this assumption is unfounded.

Milk was used in the first place because it offered the advantage of being a universal product and possessing a constant chemical composition. Its use was continued in the treatment of gonorrheal ophthalmia when brilliant results were consistently obtained. Furthermore, because of its complexity, milk produces a good reaction due to the variety of enzymes included in its cleavage products.

In answer to those who would continue to use substances like diphtheria antitoxin or vaccines as standardized substances, I might say that the "toxic-coefficient" or "reaction coefficient", so to speak, of these substances varies greatly with the strain, age of vaccine, method of culture, and the varied personal equation of each individual to them, so that the dosage and reaction cannot be determined beforehand. Again, artificial preparations of protein and their derivatives have been shown to be subject to considerable variation in composition, and their reaction becomes even more variable in relation to the personal equation of each patient.

As in other endeavors in therapeutics, an active principle or specific has been looked for in the action of milk. We therefore see the use of substances like casein, aolan, caseosan, and the like. The latter are merely sterile solutions of casein. We may, however, briefly dismiss the subject through a summary of the vast amount of literature which reveals that their use is far inferior to that of whole milk. Müller[15] is of the opinion that casein merely represents a foreign protein and is not the active principle, and that the other constituents of milk will give similar reactions when injected parenterally.

Dosage: The amount of milk injected parenterally for the treatment of blennorrhea varies with different workers. In the treatment of the cases outlined below, ordinary stock pasteurized milk was brought to a boil in a double boiler and boiled for four minutes. Ten to twenty c.c. of this was injected intragluteally on successive days or on alternate days, depending upon the reaction in the patient. The

number of injections and the amount of milk injected depends upon the age of the patient, the urgency of the case, and the severity of the reaction produced. In all these cases a complete cure was obtained with the use of milk injections. In adults larger doses were employed and at shorter intervals, since the adult is less sensitive and more stable to medication of all kinds. The slight variations in technique and the slight variations in the bacterial content of milks has been proven to be of little consequence therapeutically.

Contraindications: No ill results from milk injections were observed in the cases here recorded, and few cases of anaphylactic shock following intramuscular milk injection have been recorded in the literature. The reason given for its innocuous effect is that through boiling milk loses its power to develop anaphylaxis. Yet it should be used with great caution where there is a history of hypersensitiveness either to milk or to its individual proteins. Further, in the adult, the use of milk may prove detrimental in cases of myocardial involvement, alcoholism, and pregnancy. Lindig[16] and Uddgren[17] consider diabetes a contraindication to the use of foreign proteins in general, because of the vascular changes often associated with this disease. Hann[18] points out that milk therapy in children suffering from asthenia or status lymphaticus may prove fatal, while in scrofulous children there may be a protracted fever for several weeks following milk injections.

Clinical studies: In the study of smears and scrapings taken every two hours from the bulbar conjunctiva of the gonorrheic eyes of infants and adults, it was determined that the gonococci are destroyed in about 36 to 72 hours under milk injections. The epithelial cells of the bulbar conjunctiva, as well as the large mononuclear lymphocytes and polymorphonuclears, play a very important rôle in the destruction of the gonococci. With the reaction following the first milk injections the gonococci, just before they are phagocytosed, become grouped in thick clusters near the leucocytes and the intracellular ones are seen thickly crowded together within the phagocytes. Shortly after the gonococci are ingested they begin to appear hazy and indefinite in outline, indicating their autolysis, while fewer extracellular ones are seen.

With these findings there is associated the clinical observation of a rapidly improved condition of the eyes. The metamorphosis of the eyes from the swollen, closed lids, chemotic conjunctiva, and profuse gonorrheic discharge to the normal appearance occurs usually within three to six days from the initial milk injection, without any local treatment other than occasional wiping away of the streaming pus during the first day or two.

Occasional exacerbations encountered when all traces of inflammation had left were mild and were not accompanied by chemosis, and they were again easily controlled by further milk injections. Such exacerbations are either the result of a reinfection or are due to the presence of viable gonococci in the deeper layers of the bulbar conjunctiva which have escaped the first course of milk injections. One case in which the patient was seen late in the disease developed a corneal ulceration which finally healed over. As the corneal resistance is lowered by the chemosis, the digesting action of the inflammatory products, and the bacterial toxins, it is important to institute vigorous milk therapy early to prevent such corneal complications.

The general reaction in milk injections: The physiological reaction as the result of parenteral milk injections may be classified into general and local. The general reaction is often ushered in by a distinct chill four to eight hours after the initial milk injection, and begins to wear off from two to three hours later, reaching the former level within twenty-four hours. With the subsidence of the chill, or during its later stages, the temperature starts to rise. Its maximum, ranging

between 101 and 105 degrees, may not be reached for six or eight hours after the injection or even longer, but its normal level is usually reached again within twenty-four hours. At times, not altogether rarely, the rise in temperature is accompanied by a chill, more often by sweating, and sometimes by headache and backache.

With the febrile elevation, the pulse is invariably increased in proportion. A slight rise in blood pressure accompanies the chill, and with its subsidence there is usually profuse sweating. Amongst other symptoms noted are nervous irritability, increased glandular activity, diuresis, and sometimes headache, nausea, and vomiting, although all these are rare.

A marked increase in the leucocytes, preceded by a short leucopenia, is a very striking and important manifestation in these reactions. Polymorphonuclear leucocytes are found to predominate, but an increase in transitionals, large mononuclears, and eosinophiles appears later.

The importance of leucocytic enzymes in disease has been emphasized by Fiessenger and Marie[19], and the Metchnikoff school of phagocytosis is well known to all. Another manifestation of the reaction as the result of protein split products in parenteral milk injection is the immediate increase and concentration of the lymph proteins as shown by Davis and Petersen[20]. Löwy[21] observed a very prompt increase in blood sugar upon milk injection, while Petersen and Eggstein[22] determined an increase in the titer of the protease and lipase ferments. Löwy[23] and von der Velden found an increase of fibrinogen after milk injections. What rôle of importance the above findings play in the beneficial mechanism of milk injections will be considered herewith.

The focal reaction in milk injections: The focal reaction is the result of protein cleavage products being brought to the focus of infection. This is manifested by a reduction of pain in the eyes, rapid decrease of the bulbar chemosis and swelling of the lids, and a rapid decrease in the secretion. The physiological mechanism involved is first a short increase in the inflammatory condition, followed by a longer period in which the capillaries become less permeable, the fluids diminished, tension and pain lessened, and finally restitution occurs. The increased flow of lymph, with an increase of antiferments and enzymes resulting from cleavage of the parenteral milk injections, as well as the increase in phagocytosis, must necessarily exert, as we have seen, a considerable effect on the infecting gonococcus, and on the removal of its resulting pathological products.

The nature of the immunological reaction: As regards the immunological mechanism concerned in the general and local processes there has been much conjecture and debate. Suffice it to say that one school believes in the antibody mechanism, while the other, probably with more reason, adheres to the theory of reactions of proteolytic enzymes produced through cleavage of the milk parenterally injected. The answer to these questions must necessarily be left for the future, when the chemical structure of the protein molecule is determined. Then we may have some idea as to what constitutes an antibody, a protein-split product, an anaphylatoxin, or an enzyme.

Case histories: Case 1: O.I., a female child, aged two years, entered the

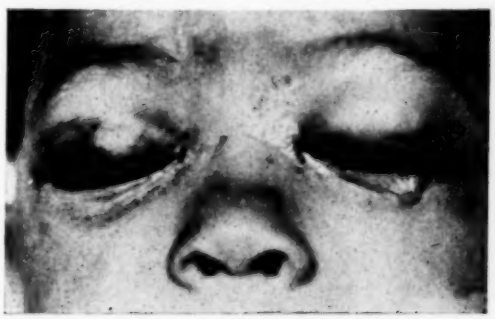

Fig. 1 (Muskat). Photograph taken before treatment, showing swelling of both eyes and profuse gonorrheal discharge.

Cook County Hospital on October 10, 1923, with a bilateral gonorrheal ophthalmia of three days duration, secondary to the gonorrheal vaginitis which

was still present. There was marked swelling and redness of the lids, marked chemosis of the conjunctiva, and profuse discharge. Smears and culture revealed the gonococcus. Four milk injections, two of three c. c., and two of four c. c., were given intragluteally on the first, second, fourth, and fifth days, respectively. Within twelve hours after each injection the temperature rose to between 102 and 104 degrees, and the leucocytosis to between 14,000 and 19,000. No rigors were noted. The discharge from the eyes

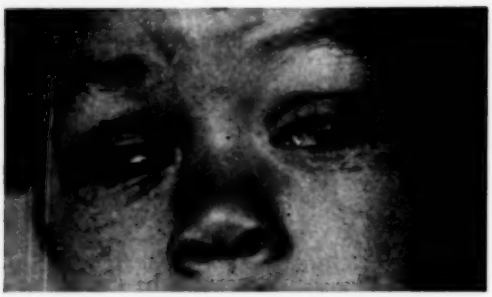

Fig. 2 (Muskat). Photograph taken on second day after treatment was begun. This represents the result of two milk injections. The right eye is practically normal.

was greatly reduced twelve hours after the initial injection, and all chemosis and swelling disappeared within twenty-four hours. Smears examined every two hours showed the characteristic clumping of the gonococci around and within the leucocytes twelve hours after the first injection. By the fourth day, only a few diplococci were seen, practically all intracellular and indefinite in outline (autolysis). A relapse occurred in one eye without the chemosis. This was readily controlled by subsequent milk injections. The vaginitis had greatly improved with the milk injections, but after discontinuing these there was a relapse which was treated by other measures.

Case 2: F.C., a male adult negro, aged twenty-six years, entered the Cook County Hospital on November 19, 1923, with a marked gonorrheal conjunctivitis of the right eye of five days duration, secondary to a gonorrheal urethritis which he had contracted six weeks previously. Four intragluteal milk injections of twenty c. c. were given on the first, second, fourth, and fifth days, respectively. The characteristic marked rise in temperature and leucocytosis followed each injection. A marked chill also followed each injection. The first, lasting four minutes, occurred three hours after the first injection. The second, lasting ten minutes, and so severe that the entire bed shook, occurred twelve hours after the second injection. The third, which was sudden and severe, occurred eleven hours after the third injection and lasted fifteen minutes. The fourth chill, of less severity, developed three hours after the fourth injection, and lasted three minutes. Marked backache, headache, and pain in the eyes accompanied these chills.

Smears twelve hours after the first injection showed the characteristic grouping of the gonococci within and around the leucocytes. At the end of eighty-four hours (three injections had been given) the smears showed only few, indefinite gonococci, practically all intracellular and staining very lightly (autolysis). Twelve hours after the initial injection the chemosis and secretion were greatly reduced. There was very little secretion by the sixth day, but a relapse was evident the next day in the form of a superficial ulceration. This seemed to be due to the infection and digestion of a fold of limbus conjunctiva which had swelled during the past twenty-four hours and lay over and against the cornea. The ulcer was treated with atropin, dionin, and hot dressings, and in three days all traces of infection had left.

Case 3: R.W., a female child, aged three weeks, entered the Cook County Hospital on November 27, 1923, with the classical picture of bilateral ophthalmia neonatorum, which had first manifested itself three days after birth and had rapidly grown worse. Two milk injections of five and eight c. c. were given on the first and third days,

respectively. Twelve hours after the first injection, all chemosis, swelling, and redness had disappeared, and there remained but little secretion. The eyes were practically normal on the fourth day. The child developed a generalized erythema on the twelfth day, with a temperature of 105 degrees. This subsided in a few days, and with it all traces of the gonorrheal ophthalmia. This reaction was no doubt a protein reaction. The characteristic leucocytosis and fever reaction with the characteristic smear appearances corresponded to the cases outlined above.

Case 4: M.W., a male adult, white, aged nineteen years, entered the Cook County Hospital on October 19, 1923, with a characteristic gonorrheal conjunctivitis of the left eye. He also had a urethritis which he had contracted a week previously. Five milk injections were given, of fifteen, twenty, fifteen, and twenty c. c., on the first, second, fourth, fifth, and seventh days, respectively. The temperature rose to between 102 and 104 degrees after the injections, and the leucocytosis to between 17,000 and 23,000. A severe chill occurred four hours after the first injection, and lasted one hour. This was followed by a moderate sweat and pain in the back, the latter persisting eleven hours. A second chill occurred three hours after the second injection, lasting a half hour. A severe backache remained for seven hours. Another chill occurred five hours after the fourth injection, and lasted one hour.

Twelve hours after the initial injection, the chemosis and secretion were greatly reduced, and the smears at this time showed the characteristic clumping of the gonococci around and within the leucocytes. Within thirty-six hours no chemosis was evident and practically no secretion. The eye appeared normal on the morning of the sixth day, but there was a relapse of the urethritis and of the eye condition at two p.m. without chemosis of the conjunctiva. Smears again revealed a considerable number of intracellular and extracellular gonococci. The fifth injection, of twenty c. c., was given the following day, and the urethritis treated locally. The patient left the hospital a few days later with a perfectly normal eye.

Case 5: C.P., an adult male aged twenty-six years, entered the Cook County Hospital on October 23, 1923, with a left gonorrheal conjunctivitis of seven days duration. An acute urethritis had been present for the past fourteen days. The left eye revealed a moderate chemosis of the conjunctiva. The entire cornea was dull and infiltrated and there was a large superficial corneal ulcer. Several deep corneal abscesses, yellow in color, about the size of pin heads were also in evidence, and there was marked ciliary and conjunctival injection and a moderate purulent discharge. The patient could only count fingers at four inches with his left eye. The right eye revealed some conjunctival injection, but only slight discharge. Five milk injections, of twelve, fifteen, fifteen, twenty, and twenty c. c., were given on the first, second, fourth, fifth, and seventh days respectively. Hot dressings and atropin were added throughout the treatment. The characteristic rise in temperature and leucocytosis followed these injections. A severe chill four hours after the first injection lasted one hour and was followed by a hot feeling and a moderate sweat. There was a terrific rigor two and a half hours after the second injection, lasting a half hour. No chills were evident after the other injections.

Twenty-four hours after the first injection the chemosis of the left eye had considerably decreased. Twenty-four hours later (two injections given) there was less corneal infiltration and the superficial ulcer was less extensive and the secretion greatly diminished. The right eye appeared normal by October 27th, and smears revealed only an occasional gonococcus. There still remained moderate circumcorneal injection and infiltration but very little secretion. After the last injection the ulcer healed rapidly. Under frequent hot dressings and atropin instillations,

the eye gradually returned to normal in a few days. There remained only a slight superficial scar.

Case 6: M.H., a negro boy, aged nine years, entered the Cook County Hospital on December 12, 1923, with a marked left gonorrheal conjunctivitis. Since entrance, the boy had been treated in the children's venereal ward, with the usual potassium permanganate irrigations every hour. In spite of this treatment there was a seemingly endless profuse discharge from his eye. The first milk injection of twelve c. c. was given on December 17th. A moderate chill followed four hours later, and lasted a half hour. The next day there was marked improvement. Twenty-four hours later there only remained slight redness of the eye, with but little secretion. On the third and fourth days, nineteen c. c. and fifteen c. c. of milk were injected, respectively. By the sixth day the eye appeared practically normal save for a very slight amount of secretion which had accumulated at the canthi during the past twenty-four hours. This cleared up in two days under argyrol.

Summary

(1) Parenteral injections of sterile whole milk offer the best foreign protein treatment in gonorrheal ophthalmia.

(2) The number and frequency of the injections vary with the age of the patient and the reaction elicited. Amounts up to ten c. c. in infants and up to twenty c. c. in adults are well tolerated.

(3) A marked amelioration is evident in twenty-four to thirty-six hours after the first few injections, and a complete cure in from three to six days.

(4) In the study of smears and scrapings of the bulbar conjunctiva taken every two hours from the gonorrheic eyes, it was determined that the gonococci are destroyed in about thirty-six to seventy-two hours following the reaction from the milk injections. There is first a clumping together of the gonococci within and around the phagocytes. The phagocytes and proteolytic enzymes of the tissues digest and destroy the gonococci as evidenced by their rapid decrease in number and their faintly stained appearance within the leucocytes.

(5) The general reaction to parenteral milk injections is shown by an increase in temperature and a chill, followed by sweating and accompanied by a marked leucocytosis. With these there is a general increase and activation of the proteolytic enzymes and protective substances of the body, together with a general activation of all the body tissues.

(6) The focal reaction is manifested first by a short negative phase during which the tissues of the eye are rendered more abnormal than heretofore, followed by a longer protracted phase during which the tissues return to normal.

(7) The combined general and focal reactions brought about through cleavage of the parenteral milk injected are detrimental to the gonococci.

30 North Michigan avenue.

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TAPETORETINAL DEGENERATION OF THE RETINA: CASE REPORT

A. SPARE, M.D.*

CHICAGO

The patient whose case is reported was twenty-six years old and had been blind since infancy. She had an older sister who was blind, and a younger brother who was partially so, but several other members of the family had normal vision. The retinal vessels were greatly attenuated, and the fundi were strewn with small, round, discrete, brownish-yellow dots. The maculas were cherry red. The author discusses the characteristics of various types of tapetoretinal degeneration, that is, forms of retinal degeneration in which the pigment epithelium is implicated in the pathologic process, and in which the etiology is traced to hereditary dystrophic influences. Read before the Chicago Ophthalmological Society, February 20, 1928.

Gussie M., American, 26 years old, was admitted to the eye department of the Central Free Dispensary in 1925. The historic facts having a possible relevancy are as follows:

She has been blind ever since she can remember. The oldest sister has also been sightless from infancy. A younger brother is partially amaurotic. The other members of the family, including two stepbrothers from the father's second marriage, have normal vision. All the children were delivered at full term. The parents are Russian Jews but are not blood relations.

General medical and laboratory examination revealed nothing of import. The compensatory sharpening of the auditory response, characteristic of the

* Deceased.

congenitally blind, was present in a marked degree. But the most spectacular instance was afforded by the touch and muscle sense. She could locate the "eye" of a needle with the tip of her tongue, and with an uncanny manual maneuver and steadiness, invariably thread it. The intellect was normal.

Eye examination: Vision was limited to perception and projection of light. Externally, the amaurotic condition was betrayed by a vibratory nystagmus, which became accentuated when the patient tried to "fix". The oscillations, of rhythmic form, were principally vertical but somewhat rotatory. A slight degree of convergent squint was present in the right eye. The pupils responded to mydriatics, but not to light. The refractive media were clear. Retinoscopy showed +7.00 sph. +1.00 cyl. ac. 100° in each eye.

With the ophthalmoscope, both retinas looked "spongy". The larger blood vessels were very much attenuated and reduced in number; while the smaller branches and the terminal extensions of the larger were completely obliterated. It was impossible to differentiate arteries from veins. The fundi were strewn with small, round, discrete, brownish-yellow dots, which formed constellation-like aggregations towards the maculæ. The papillæ were faintly bleached and appeared "waxy"; and their margins, for the most part, were distinct. The maculæ looked cherry-red, with a sprinkling of fine pigment granules. Lumpy pigment deposits were seemingly absent.

A thorough and satisfactory examination of the eyegrounds could not be obtained, since the persistent nystagmus and almost complete amaurosis precluded the possibility of a steady and directional "gaze."

The late Dr. Feingold of New Orleans, who had seen the patient three years before, was kind enough to send a copy of his private record for comparison and verification. Mention was there made of "somewhere to temporal side of right macula, a heavy black spot of pigment." Repeated search was instituted in the indicated area for the black spot, but without success. Depigmentary changes, most likely, had since then rendered it invisible.

The case was examined by Dr. William Wilder and his staff of coworkers of the Rush Medical College.

The diagnosis of diffuse tapetoretinal degeneration was made in this case after careful sifting and analysis of the adduced facts.

Discussion: When retinal diseases are classified with the object of eliciting etiologic kinships, sundry groups of various features come into view. One of these emerging groups is particularly conspicuous. Its special characteristics are:

(1) familiarity,
(2) symmetry,
(3) progressiveness,
(4) absence of inflammatory changes, and
(5) presence of pigmentary disturbances.

The involvement of the tapetum nigrum, which is invariable in these cases, gives them the distinction of "tapetoretinal degenerations." All retinal affections, therefore, which have the above-enumerated qualifications, become, ipso facto, legitimate members of that group.

Etymologically, tapetoretinal degeneration embraces every variety of retinitis in which the pigment epithelium is implicated in the pathologic process. Clinically, however, the extension of the term is restricted to those instances in which the etiology is traced to hereditary dystrophic influences.

Three topographic forms are recognized:

(1) central, or symmetric-macular;
(2) equatorial, or retinitis pigmentosa; and
(3) generalized, or diffuse tapetoretinal.

Subjectively, there will be nyctalopia in the first; hemeralopia in the second; and amaurosis in the third.

The exclusion of "Tay-Sachs" disease from the above list is intentional, as it is primarily a degeneration of the ganglionic stratum and is therefore originally neuroretinal. In this paper

we are considering those conditions in which the degeneration is primarily of the rod and cone layer, i.e., tapetoretinal affections.

Dr. Herbert Watt Torrance* makes a herculean effort to affiliate amaurotic family idiocy ("Tay-Sachs" disease) with symmetric macular degeneration. He takes up in consecutive order (1) age incidence, (2) race proclivity, and (3) eye symptoms of the two diseases; and strives to show that the existence of "atypical forms" makes a connection between the two possible.

The gist of his argument is that neither disease is "stereotyped," but rather "archetyped"; that considerable departures from text-book descriptions are occasionally encountered; that such "transitional" types approach each other from the two sides, and that the clinical gap separating them is thus satisfactorily bridged. (The expressions in quotation marks are mine.)

Their initial degeneration, however, as already intimated, does not warrant their mutual assimilation. Treacher Collins, who has given a great deal of philosophic thought to this subject, emphasizes to the utmost the fundamental difference between their respective pathologies, and calls accordingly for separate classification.

The consideration of all these facts and a few others which are to be presented forces the conclusion that the case under examination is one of diffuse tapetoretinal degeneration. The unquestionable presence of the classical syndrome identified it with the tapetoretinal group; and the amaurosis, with the diffuse variety.

Unfortunately there is a deplorable absence of illuminating data on this particular subject. Medical literature, which is otherwise so prolific, is lamentably sterile on diffuse tapetoretinal degeneration.

Fuchs gives the following description of the disease. "The diffuse form (of pigmentary changes) causes total or nearly total blindness, which may begin at or about birth or not till later in childhood. It often occurs in several members of the same family, and is frequently associated with cerebral degeneration producing amaurotic family dementia—a condition not to be confounded with amaurotic family idiocy. It is a not infrequent cause of congenital blindness."

To gain some idea, however, of the "acting forces behind the curtain," recourse must be had to a comparative analysis of its "sister-diseases," symmetric macular degeneration and retinitis pigmentosa, with which, as already pointed out, the diffuse form is related as one of the species.

The important fact which is essential to remember in connection with this analysis is that tapetoretinal degeneration and other degenerations which are somewhat akin to it, such as Tay-Sachs disease, Doyne's choroiditis, and Leber's optic nerve atrophy, are expressions of local changes which, while modifying or inhibiting the normal trophic processes, bring about premature senility of the involved tissues, atrophy, and an eventual state of abiosis or death. Hence the name of abiotic atrophy or "abiotrophy."

The term was originally used by Dr. Gowers in a comprehensive or general sense. Treacher Collins, however, in an address before the International Congress of Ophthalmology, 1922, introduced it formally as a special term in eye pathology. Under the head of "ophthalmic abiotrophies" he grouped seven kinds of hereditary ocular degenerations.

The principal idea which underlies this conception is that the phenomena exhibited are the results of factors ordinarily physiologic, but which become pathologic when, for causes still obscure, their activity is intensified or hastened and effects are produced which, for the human being, are altogether untimely. In other words, the affected structures are not originally malformed or embryologically defective, but the conditions essential to the maintenance of vital activity which, in the normal, are more or less favorable during an extended period of time are, in the abiotrophies, unfavor-

* Glasgow Med. J. Apr., May, June, 1922.

able from the very beginning. The potential faculties of the cells, for want of proper trophic environment, are not realized.

In addition, the reactive impotence of the implicated elements themselves must be considered and conceded; since familial participation, whenever it appears, points indubitably to an inherited germinal defect. Hence, in an ultraanalytic sense, two sets of factors, extrinsic and intrinsic, are etiologically responsible—the former for not supplying in proper amount the nutritional elements requisite to tissue dynamics, the latter for not responding in a vigorous tone to physiologic demands. As to whether their respective powers of assertion are equal, unequal, or related as cause and effect, is, with our limited knowledge of heredity and its laws, unanswerable. The background of all these pathologic pictures is too indefinite to allow any categorical statement.

Not all eye tissues, however, are equally or with like frequency affected by the abiotrophic process; some more, some less, some not at all. Here, as elsewhere, the fate of the tissue is a question of susceptibility and immunity. The general law—that the sensitiveness of a tissue to degenerative changes is in direct proportion to the degree of its specialization—decides the issue in these diseases also. The choice of the victim, therefore, is not a matter of chance, but one of selection. Hence it is manifest that in the "struggle for existence" engendered by these presenile conditions the most specialized elements, the retinal, are, in the majority of cases, the first to fall; the less specialized, like the choroid, lens, cornea, and muscles, relatively seldom, while the passive selerotic resists the onslaught almost to the very end.

The principal histologic changes in symmetric macular degeneration are confined to the layer of rods and cones, and consist of the disappearance of cones, migration of pigment epithelium, and increase in neuroglia (Mayou). The frequent involvement of the ganglionic elements in this affection is regarded by Coats as secondary.

Here, as in retinitis pigmentosa, as soon as the cones have degenerated and the pigment epithelium is liberated from its physiologic service in supplying visual purple, the pigment becomes atavistic: it reassumes its primitive proclivities and starts on a career of active proliferation.

All cells, it will be recalled, multiply at a high rate in an embryonic state; else the rapid amassing of cells destined for up-building of tissues would be impossible. But the nearer a tissue approaches completion, the less prolific become its elements; so that when it is fully formed only such additions are made as are necessary for ordinary repair and maintenance. If, however, there is considerable destruction of parenchyma, as in trauma or infection, then the restitution of continuity becomes the work of the intervening supporting units which, being more embryonal in type, retain high regenerative powers throughout life. Clinically, these changes manifest themselves as leucomata, cicatrices, and fibroses.

The mobilization of the unused power of the pigment epithelium for reproductive purposes is not the sole effect of its reversion. Another phenomenon, also of a primitive nature, appears. Even ordinarily, in their normal habitat, the pigment epithelia are "positively phototactic"—send out fine protrusions into the outer segments of the rod-and-cone layer in the presence of light, and retract them in the dark. But when the anatomic pressure of the superjacent rod-and-cone layer and the mechanical obstruction of the external limiting membrane are removed, then these movements become typically ameboid and a massive migration begins. The degenerated area thus becomes invaded territory where the newcomers either settle or are on their way to more distant destinations.

The form of the pigmentation is determined by the peculiar topography. In retinitis pigmentosa, where the peripheral portions are involved, the

pigment cells are lodged in the perivascular lymph spaces: in degeneration of the macula, a nonvascular tissue, they are deposited in the loose retinal layers. In the former, therefore, they are branched—like bone-corpuscles; in the latter, they are unbranched—mere dots.

The present condition of the fundus in the case here reported, which is comparatively pigment-free, gives no idea either of the original massive migration of the tapetoretinal elements, or of the important rôle they have played in the past history of the disease. Their invisibility, however, in abiotrophic affections, is no argument against their activity. The cells themselves even may be present, and yet, owing to a depigmented state, escape detection.*

A striking illustration of the foregoing truth is afforded by congenital hemeralopia or retinitis pigmentosa sine pigmento (without pigment). The clinical course of this disease points conclusively to the fact that the underlying pathologic process is identical with that of retinitis pigmentosa, except for the absence of picturesque melanosis. In other words, the negroid elements are there but, for one reason or another, can not be seen.

There are several ways in which decolorization is effected.

In the first place, the epithelium may be originally deficient in pigment content. Whether their rapid multiplication is the result of stimulation by choroidal inflammation, or of a relief of pressure through the degeneration of the rod-and-cone layer—whatever be the initial urge, the consequence is practically the same; the pigment share for each unit becomes, under such conditions, greatly reduced.

When these partially pigmented, mulatto-like intruders reach the cerebral layers of the retina, all they can possibly achieve is to give the fundus a "salt-and-pepper" appearance.

In addition, there are active agencies, either new substances or leucocytes, which bleach, dissipate, or otherwise abstract the pigment granules and eventually leave the hosts with a physiognomy ophthalmoscopically indistinguishable from that of their immediate pale neighbors.

To what extent the process of depigmentation is likely to go on is convincingly reported by Oatman. He says: "The retinal spots observed in 1910 (a case of familial macular degeneration) have given place (in 1911) to unmistakable light reflexes. In the macular region the pigment entirely disappeared and several orange-colored choroidal vessels are exposed." (Oatman: Maculocerebral degeneration: Am. J. of Med. Sci., 1922.)

Pigment is deposited in lumps or streaks—punctate or striate. "The white spots in the retina may be due to various pathologic changes. They may be varicose thickenings of the nerve fibers, fibrinous exudates, heaps of lymphoid cells, patches of fatty degeneration of the retinal tissue, or foci of embolic inflammation or calcification. These pathological conditions can not be distinguished apart with the ophthalmoscope." (Roemer's "Textbook of Ophthalmology," p. 746.)

The vascular changes observed in these cases are rather striking, and contribute considerably to the classical appearance of the eyegrounds. Marked attenuation of the larger vessels and effacement of the smaller are constant concomitants. Eventually the reduction in caliber may even reach a degree at which every trace of structural difference between artery and vein is removed, and the existence of either is represented merely as a slender thread.

These changes can not, with strict adherence to scientific terminology, be called arteriosclerotic, since the cardinal features characteristic of this

* It may not be amiss, in this connection, to point out that perimetric studies of retinitis pigmentosa give corroborative evidence of its abiotrophic nature. The location of the original, annular scotoma in "the 10-15° zone" is found to correspond, according to Collins, with that belt of retinal tissue which is the earliest to develop, and hence the oldest—embryologically and phylogenetically. The implied significance is obvious. If retinitis pigmentosa is, as a pathologic process, akin to senile degeneration, the death of the aged members must necessarily precede that of the younger.

disease are missing. There are no cork-screw windings of terminal twigs, no flattening and indentation at crossings, and no perivasculitic lines. In the absence of positive data on this subject, and judging from the ophthalmoscopic appearance alone, one is rather inclined to consider this dwindling of the vascular structures as a process of ordinary shrivelling and withering, caused, most likely, by disuse, malnutrition, or both.

The operation of the Mendelian law in some of these tapetoretinal diseases has been verified in sundry instances.

Nettleship gives an account of one Jean Nougaret (born 1637), who was affected with "night-blindness," and whose descendants, to the number of two thousand, have been traced and their clinical condition recorded. Three phenomena were observed.

1. The disease behaves as a "unit character," i.e., its occurrence is independent of any concomitant disturbances.

2. It is dominant.

3. No normal member of this stock who married another normal, whether related or not, ever transmitted the disease—pure recessives.

In contrast with "dominant" night-blindness, which is due to an abiotrophic condition, stands "recessive" albinism which is due to an ontogenetic defect.

G. C. Hurst reports that even pure blue-eyed individuals are recessive to brown or dark-eyed. Professor and Mr. Davenport have corroborated this observation, independently.

The implication of all these facts, however, is identical. One set of them is merely the obverse of the other. Whether blue eyes have relatively a deficient quantity of pigment, or the dark eyes a superabundance, the conclusion in either case is that melanosis is dominant to albinism.

Summary

1. Tapetoretinal degeneration is a hereditary dystrophic process, which is etiologically responsible for a distinct group of ophthalmic affections.

2. Five essential features constitute its clinical syndrome: familiality, symmetry, progressiveness, absence of inflammatory evidence, and presence of pigment changes.

3. Different topographic involvements of the retina resolve the group into three varieties: polar, equatorial, and generalized.

4. Visual defects resulting from these lesions are, in their enumerated order, day, night, and total blindness, respectively.

5. Tapetoretinal degeneration, in company with other affections, belongs to a more comprehensive class, called by Collins "ophthalmic abiotrophies."

6. Two factors are theoretically associated with their etiology: extrinsic and intrinsic—trophic and germinal.

7. Histopathologic changes have their primary seat in the neuro-epithelial layer.

8. The principal elements affected are the percipient and the tapetal: the former disappear, the latter proliferate.

9. Additional alterations are caused by the liberation, mobilization, and migration of these pigmented cells.

10. Their presence and activity, however, are not necessarily betrayed by the ophthalmoscope: absence, abstraction, or bleaching of the melanotic content may render them elusive or invisible.

11. White dots in the fundus may be due to various histologic components. But their differentiation or identification can not be accomplished with the ophthalmoscope.

ONE HUNDRED SENILE CATARACT OPERATIONS
at the Presbyterian Eye, Ear, Nose and Throat Hospital, Baltimore

ERNEST A. KNORR, M.D.

BALTIMORE

The one hundred operations are tersely classified as to race and sex, age, type of operation, eyes lost, miscellaneous features, and vision. Certain conclusions are presented. Read before the West Baltimore Medical Association.

This is a report of one hundred senile cataract operations that were performed at the Presbyterian Eye, Ear, and Throat Hospital, Baltimore, Maryland, between August 18, 1925, and January 31, 1928.

The operations were consecutive. There was no selection other than that of determining whether they were suitable for operation. All patients were accepted for operation who had good light projection, an active pupillary light reflex, and freedom from all external and internal eye inflammations, unless there was some general contraindication such as abscess on the back of the neck, skin lesion of the face, active leg ulcer, dyspnea, vomiting, or cough.

Evolution of the cataract operation was given a marked impetus when Smith devised the Indian method which was later modified by Barraquer, Knapp-Török, and others. The published reports of operators of large experience have been statistical and comparative, in an effort to determine whether one operation shades the others a little. Technique has been improved and new procedures introduced in an effort to devise a standard operation, i.e., one that is applicable to the majority of patients, which yields the best average results and incurs the least risk. Accumulated experience may point the way to the perfect operation, but, as there is a variation in the type of patient, the character of the cataract, and the kind of eye, there arises the necessity for individualization and selection.

The following is a summary of the usual points of interest as regards our series:

Race and sex: white males 49, white females 36, colored males 8, colored females 7.

Age: the youngest patient was 42 years old and the oldest 84. The largest number, 12, were operated upon in their 72nd year, divided into decades as follows: 5th, 8; 6th, 18; 7th, 38; 8th, 32; 9th, 4.

Type of operation: combined extraction, 83; simple, 10; Smith Indian, 2; Knapp-Török, 5.

Loss of vitreous occurred in seven cases, once before, twice with, and four times after extraction of the lens. The combined extractions show loss of vitreous in 3.6 per cent; simple extractions in 20 per cent; Smith Indian, 100 per cent; and Knapp-Török in none. Loss of vitreous occurs oftener among negro patients than white, 13.3 as against 5.8 per cent. T. Harrison Butler[1] says that the English make the best cataract patients. I can supplement that statement by saying that negroes make the worst. Occasionally we encounter a negro who makes a very good patient, but as a rule they stampede just about the time that the corneal section has been made and lose all self-control. Their orbicularis palpebrarum muscles are so well developed that they can bend any eye speculum out of shape.

It is among these patients that profound anesthesia, lid infiltrations, blocking the seventh nerve, and conjunctival sutures find their greatest usefulness. Dunphy[5] in a survey of 2560 cataract operations performed at the Massachusetts Eye and Ear Infirmary has shown that the percentage of loss of vitreous cases is greatly lessened by the use of deep orbital injections and lid infiltrations of procain. In these cases the vision obtained after two simple extractions was 20/40 and 20/100; two Smith, 20/20 and 20/100; three combined, 20/70 each.

The percentage of cases of loss of

vitreous, while more or less indicative of the skill of the operator, is also dependent upon other factors; viz., type of operation, combined extractions showing the least and the Smith operations the greatest number; and type of patient, negroes showing the largest percentage.

Moderate loss of vitreous is not incompatible with good vision, yet it is a condition dreaded by eye surgeons. Dunphy's survey showed that such eyes deteriorate long after the operation. In this series the right eye was affected in 41 cases and the left in 59. The ratio of right eye to left in white males was 18 to 28, in white females 19 to 21, in colored males 1 to 7, in colored females, 2 to 3. This disproportion, most marked in the colored male, probably would not hold good in a larger number of cases. I did not record the occupations of these cases, so that the record does not shed any light on the theory that in right-handed firemen, glass blowers, and others, the left eye is more exposed to the heat of the furnace or incandescent glass and hence more apt to develop cataract.

Prolapse of the iris occurred in two cases; one a Knapp-Török, and the other a simple extraction in which an apical conjunctival suture was employed and the prolapse occurred at the nasal end of the corneal section. The prolapsed portion was excised after several days, and both cases secured 20/20 vision. Iritis occurred in three cases, all of combined noncapsular extraction. One was in a feeble 76 year old man, whose cornea remained depressed after extraction. Irrigation of the anterior chamber restored its normal contour. In a second case the lens was removed with the loop. In the third patient nothing unusual occurred at the time of operation, but he was a very restless and nervous subject. All obtained 20/70 vision but the last case developed glaucoma several months later.

Preliminary iridectomy was employed in but one case, as it does not add to the safety of the operation. I can recall one case that developed glaucoma after it had been performed.

Postoperative glaucoma occurred in four cases, all of combined noncapsular extraction. In one, tension occurred on the tenth day, but a prompt paracentesis relieved it. It was not necessary to repeat the operation and the patient obtained vision of 20/60. The remaining three cases obtained good vision after the operation and elevation of tension came on several months later, therefore they are not included among the lost eyes.

Lost eyes: three eyes were lost; in two instances from intraocular expulsive hemorrhage which occurred during the night after operation, brought on by vomiting in one and in the other by the patient suddenly sitting up in bed to reach for something. In the third case, the patient overlapped the cornea by constantly winking the eyelids. In all of these cases the patient passed through an uneventful operation and a successful result was expected, but they were operated upon before the suture was employed routinely. They certainly furnish a strong argument in favor of lid infiltration and conjunctival suture.

Miscellaneous: Capsule forceps used, 77; iris overlapped knife, 4; air entered anterior chamber, 40; blood entered anterior chamber, 26; irrigation of anterior chamber, 81; eversion of the cornea, 1; striate keratitis, 2; vomiting, 3; nervous patients, 12; diabetics, incomplete, 5; depressed corneas, 13 (12 of whom were above the age of 67 years); deeply set eyes, 3; paracentesis for postoperative glaucoma, 2; opacity of the cornea, 2; fundus lesions, 5; hypermature cataracts, 5; one-eyed patients, 4.

Vision: 20/15 was obtained in two cases; 20/20 in 25; 20/30 in 6; 20/40 in 22; 20/60 in 5; 20/70 in 9; 20/80 in 1; 20/100 in 12; 20/200 in 8; less than 20/200 in 3; blind, 3; not recorded, 4.

The average vision from the combined extractions was 20/55; simple, 20/35; Smith, 20/60; Knapp-Török, 20/43; general average, 20/53.

The vision for several months after the cataract operation is not stationary. Therefore, it is not a criterion of the

operation. The extremes of vision, 20/15 and blindness, are stationary, but the intervening degrees usually show a progressive improvement, therefore if we keep in touch with our patients until they have obtained their best vision the visual records will be better than if we only refract them once nine days after operation, as the vision then is often 20/100. Our cases of persistently low visual acuity were dependent upon some pathological condition, such as corneal opacities, fundus lesions, high grade myopia, amblyopia, and squinting eyes.

The cataract operation is a very satisfactory one and compares favorably with operations in other fields of surgery. The object sought, restoration of vision, is accomplished in over ninety per cent of the cases.

The small experience that I have had with the cataract operation seems to be in accord with the following conclusions of other operators:

(1) Parker[2]: that combined extraction is the safest operation.

(2) Verhoeff[3]: that immature and hypermature cataracts are especially suitable for the intracapsular forceps operation.

(3) Wilder[4]: that the traditional safety of preliminary iridectomy is not borne out by statistics.

(4) Derby, Dunphy, and others[5]: that profound anesthesia and lid infiltrations lessen the number of cases of loss of vitreous.

(5) O'Brien[6]: that the orbicularis palpebrarum muscle can be paralyzed by injecting two per cent procain solution at the anterior margin of the parotid plexus.

(6) Würdemann[7]: that the conjunctival suture has increased our control over the cataract operation and materially added to its safety.

806 Fidelity-building

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NOTES, CASES, INSTRUMENTS

X-RAYS INEFFECTIVE AGAINST HERPES VIRUS*

THEODORE L. TERRY, M.D.

BOSTON

The methods of treating corneal herpes at present available have been so ineffective that it seemed worth while to investigate any other possible means of combating the infection. It occurred to us that x-rays might have germicidal effect on the virus concerned. So far as we can ascertain this possibility has never hitherto been investigated. The following experiments seem to be conclusive.

Experiments: The source of the virus was a herpetic vesicle less than twenty-four hours old. A small amount of serum from the vesicle was transferred to one-third c. c. of sterile saline solution. This suspension in an open glass container was exposed to x-rays (six inch gap, five ma., fourteen inch distance, two mm. aluminum filter, fifteen minutes). With a knife needle the right cornea of a normal rabbit was immediately inoculated with the suspension in the usual way. In forty-eight hours the cornea showed a typical picture of experimental herpes. On the third day the left cornea of the same animal was inoculated with a suspension of scrapings from the infected right cornea. The left eye was then exposed to x-rays in the same dosage. In forty-eight hours the left cornea showed a typical picture of experimental herpes. The rabbit was then killed and the clinical diagnosis was confirmed by histological examination of the eyes.

Conclusion: Exposure of the eye to a dosage of x-rays as great as can be used safely is insufficient to have any germicidal effect on the virus of herpes.

243 Charles street.

* From the Pathological Laboratory, Massachusetts Eye and Ear Infirmary.

REMARKS ON X-RAY TREATMENT OF SUPERFICIAL INFECTIONS

F. B. STEPHENSON, M.D.*

DENVER

Experimental work done long since has demonstrated that sufficient x-ray dosage to kill bacteria in living tissue is destructive to the tissue itself, and roentgenologists do not now undertake treatment of inflammatory conditions with the purpose of directly killing the infecting organism.

There is, however, a rational use of the x-ray as a therapeutic agent in the more superficial acute inflammatory conditions of bacterial origin. It relieves pain and causes a subsidence of the inflammation. Some obscure biophysical action seems to promote tissue resistance, whatever that may be; whether by affecting blood circulation or lymph flow, by mobilizing blood cells, or by changing cell structure or nutrition. It is not impossible that the x-ray may modify the growth and multiplication or activity of the organism, though not killing it. Such treatment is empirical, but clinical observation of good results in boils, carbuncles, and other more superficial skin lesions has been many times confirmed and is dependable. The dosage should be stimulative, not destructive.

In herpes zoster of the common type, I have seen good results follow treatment over the involved spinal nerve roots with the more penetrating rays. The effect noted was early relief of pain and shortening of the course of the affection. Treating only the local skin lesions in one case of shingles caused a resolution of the lesions but did not relieve the pain.

It would be rational to treat herpes of the cornea with mild stimulative interval doses of x-ray, but never with

* Roentgenologist.

any one dosage approaching the near-erythema dose mentioned by Dr. Terry. This would be justified for the local effect, whether or not more deeply seated nerve involvement is present in this type of herpes.

My plan of treatment would comprise the following factors of dosage and intervals of application:

electrical potential	66 kilovolts
current	5 milliamperes
target-cornea distance	8 inches
filtration	none
time	15 seconds

Repeat dosage every other day for five to ten doses, being guided as to number by response of the pathological condition.

The retinal structures would not be injured under such a régime. A suitable cone should be used for limiting the area of exposure, but exact limitation to the lesion is not necessary nor is it desirable.

The entire cornea could be included if, rarely, the lesions were multiple. Lid retractors should be in place, if needed, to expose the lesion directly to the rays and thus avoid filtration by the lid tissues.

452 Metropolitan building.

RULE FOR MEASURING ACCOMMODATION, NEAR POINT OF CONVERGENCE, AND INTERPUPILLARY DISTANCE

CAPTAIN FREDERIC HAMILTON THORNE, M.C.

BROOKS FIELD, TEXAS

The rule described herein was devised for the purpose of supplying an efficient and rapid instrument for measuring the accommodation, the near point of convergence (PcB) and the interpupillary distance (Pd). In making original and annual eye examinations of the flying personnel, Army Air Corps, it is required that accommodation be measured and recorded in diopters and that the near point of convergence and the interpupillary distance be measured in millimeters.

The Prince rule, which is made of wood, is generally used for this purpose. This rule is equipped with a metal slide supporting the test card, but in wet weather the wood becomes swollen, causing the slide to pinch and

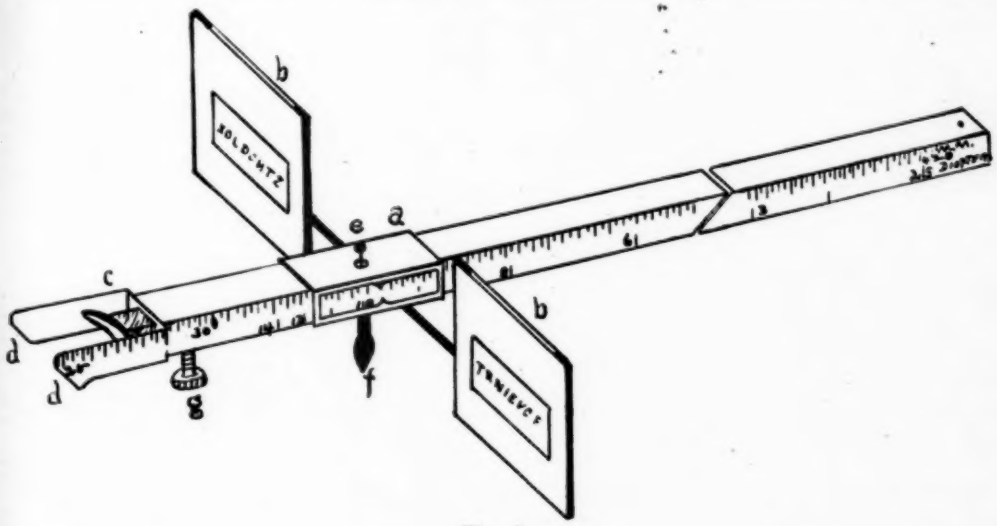

Fig. 1.

Rule for measuring accommodation, near point of convergence, and interpupillary distance.

thereby making adjustments difficult as well as causing some discomfort to the examinee.

The rule illustrated in figure 1 is made of square brass tubing 7 by 7 millimeters, and 430 millimeters in length. It is equipped with a brass slide (a) supporting two test card holders (b, b), one for either eye, an adjustable bridge (c) formed to rest comfortably upon the bridge of the nose and held in this position by two lateral tongues (d, d), one white ball (e) in the center of the slide for ocular fixation in measuring the near point of convergence, and a handle (f) for adjusting the slide.

The rule is calibrated in diopters and millimeters. The dioptic calibrations range from 14 to 2.5 diopters. This range is sufficient to cover practically all cases appearing before the examining boards.

The millimeter scale ranges from 25 to 420 millimeters. The near point of convergence is measured from the center of rotation of the eye, which lies 13.5 millimeters behind the anterior surface of the cornea. In measuring, the rule is held 11.5 millimeters in front of the cornea, making thereby 25 millimeters in all that has to be added to the reading on the scale at the point where the eyes diverge. Because of this the millimeter scale begins at 25 instead of zero, at the tip of the lateral nose tongue, making further addition unnecessary.

The adjustable nose bridge permits adjustment of the end of the rule to its position 11.5 millimeters from the anterior surface of the cornea and the lateral nose supports assist in holding it there. The adjustable bridge is maintained in its position in the rule by the thumb screw (g).

As the rule is comparatively small and of light weight, the millimeter scale furnishes an excellent means of measuring the interpupillary distance.

The test card holders are 3 by 3 centimeters square and constructed to form metal frames in which the test cards are inserted. These cards fit loosely and can be replaced as desired.

This instrument has been in use at the school of Aviation Medicine for the past year and it has proved very satisfactory.

School of Aviation Medicine.

SOCIETY PROCEEDINGS

MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA

Section on Ophthalmology and Otolaryngology

February 17, 1928

DR. WALTER A. WELLS, chairman

Early definite treatment of strabismus

DR. OSCAR WILKINSON said that the treatment of strabismus in the young child as practiced by the average ophthalmologist at the present time had not materially advanced from that recommended by Javal a third of a century ago. Ophthalmology had broken away from its narrow confines during this period and had become one of the chief diagnostic avenues to general diseases. But this wonderful transformation had not come to the relief of the squinting child, who too often was doomed to the "expectant plan" of treatment.

If properly fitted glasses did not either cure a case of strabismus or at least perceptibly reduce the degree of deviation in a few months they would never do so. Dr. Wilkinson advised occlusion of the fixing eye when visual acuity of the second eye was less than 6/60. But if vision had not improved after complete occlusion for six weeks further efforts were not apt to succeed. As soon as the visual acuity was as good as 6/9 he began fusion training with the amblyoscope. But this was of no value in children above seven or eight years of age.

If he failed to secure binocular vision and straight eyes within six months, in all children three years of age or older he resorted to some operative procedure and then began fusion training the same as in the non-operative cases. He used a modification of the Holzer-Priestley Smith tape for determining the degree of deviation at sixty centimeters and six meters. He found this method efficient and rapid, and it could be used on the youngest child. He repeated his measurements at three week intervals until five sets of measurements were taken. This gave him a definite guide as to when, upon whom, and how to operate. He urged the importance of treating the young child more energetically and assuming the responsibility more frankly.

Discussion. DR. CARL HENNING had never seen an amblyopia exanopsia regain good vision. He did not operate below six or seven years of age, because the fusion sense could not be accurately tested before this time.

DR. W. T. DAVIS said he had had great difficulty in orthoptic measures due to lack of cooperation, and hence he believed in operating early.

DR. J. N. GREEAR, JR., believed that failure to cure many cases of strabismus was due to lack of understanding of the existing conditions. In a fairly high percentage of cases of strabismus in children, preexisting congenital anomalies could be elicited if the cases were carefully studied. He used the screen and parallax test for measuring the degree of squint in all cases, if possible. Too many operators became wedded to one particular operative procedure, although no one operative measure could be applied to all cases of strabismus. Each case should be carefully analyzed before choice of operation.

DR. OSCAR WILKINSON had never seen a permanent diplopia following operation for strabismus. If a definite plan was laid before the parents they would cooperate.

Orbital abscess, secondary to anterior ethmoiditis, with marked proptosis

DR. J. B. GRIFFITH reported the case of Mrs. I. White, aged 38 years, who was first seen by him in the evening of December 31, 1927. Past history included peritonitis years ago. For the past ten years there had been a chronically infected left tear sac and for the past two years a chronic right-sided sinusitis. For the past few months she had frequently had recurring head colds.

Three days ago, December 28, she felt discomfort about the left eye. On the second day the family physician was called and found considerable conjunctival injection, but no evidence of a serious condition. On the afternoon of the third day the physician found continued pain, with marked conjunctival chemosis and proptosis.

On examination the right eye was negative. The left eye presented a brawny red color of that portion of the skin which overlay the orbit. The eyelids presented a brawny and marked swelling, conjunctival chemosis was intense, and the conjunctiva was everted on the lid margins, the eyeball pushed forward and almost immobile. Fundus was hazy with some overfullness of retinal veins; no hemorrhages or exudates seen.

Patient was brought to the Episcopal Eye, Ear, and Throat Hospital the next morning, when all signs were increased. The leukocyte count was 24,700, of which 95 per cent were polymorphonuclear. Urine showed sp. gr. 1036; albumin, a trace; sugar, small amount; acetone, a trace. Eye culture showed streptococcus hemolyticus, while the blood culture was negative.

The eyeball was enormously proptosed, its direction being almost directly forward. It being felt that the infected tear sac had probably ruptured posteriorly, with the development of a retrobulbar abscess, the patient was taken to the operating room, and two deep orbital incisions made, one above and at the junction of the middle and inner thirds, the second at the junction of the middle and outer thirds. No pus was obtained. Small drains were left in the wounds.

The same day Dr. Frederick Schreiber was called in consultation. He was unable, after most careful intranasal examination, to demonstrate any clinical evidence of sinus involvement. But this same examination twenty-four hours later revealed the intranasal spaces filled with mucopus. Dr. Schreiber performed an external ethmoid operation which revealed granulations and free pus in the anterior ethmoids. Postoperative treatment consisted of external and intranasal drainage, with suction applied daily. Patient made a slow, smooth recovery, the proptosis slowly subsiding. At the present time vision of left eye was 2/200, the proptosis had almost subsided; the eye was turned down and out and there was well advanced primary atrophy of the optic nerve.

The case was of interest particularly because of the very marked proptosis, about a half-inch, and the very gradual subsidence, taking about three weeks.

An interesting side-phase was the finding of glycosuria, with the blood sugar at its upper normal limit—120 mgs. per 100 c.c. This promptly disappeared under a sugar free diet. As the patient had no diabetic history it might have been that this finding was due to the excessive sugar intake so usual during the Christmas season.

Discussion. Dr. Frederick Schreiber said the case showed some unusual intranasal findings. There was a marked deviation of the septum to the left. There was no pus on the left side. The point of maximum tenderness was above the lachrymal sac. On the following day, after probing, the left naris was filled with pus. The patient had a latent empyema of the anterior ethmoids. At the time of operating Dr. Schreiber found a bony dehiscence of the lamina papyracea anteriorly. He therefore avoided going back too far into the ethmoid labyrinth. He believed this condition was more prevalent in adults, and it was usually secondary to sinus infection.

Dr. William Patton said he thought there might have been some infection in the frontal sinus in this patient.

Dr. Carl Henning said he had seen a number of cases of unilateral proptosis of this type, and in most of them there was no cellulitis of the orbit but swelling due to proximity of the infected sinuses.

Dr. J. N. Greear, Jr., said that most of the cases he had seen were in children, and the proptosis subsided very quickly following exenteration of the ethmoid cells, which removed the

source of infection and established drainage.

J. N. GREEAR, JR.,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

February 20, 1928

DR. ROBERT H. BUCK, president

Lens injury without complete cataract

DR. E. M. HARTLETT presented a man 33 years of age who three months previously, while working with hammer and chisel on a cast iron door, had been struck in his right eye. Pain and blurring of vision immediately followed. The next morning at the center of the cornea there was a 1 by 1.5 mm. defect with an opaque gray border raised above the corneal surface. This area did not stain with fluorescein. In the pupillary border of the iris there was a small defect in the three o'clock position. The lens showed one posterior and one anterior radially striate opacity of the lower nasal quadrant resembling the striæ of incipient cataract. The disc and macula were seen through moderately hazy media. Atropin was instilled and the pupil dilated to eight mm., revealing several fine gray radiating striate opacities in the nasal periphery of the lens, chiefly in the posterior cortex. The vitreous was slightly hazy with dust-like opacities. The extreme nasal periphery of the fundus just below the horizontal meridian showed a large reddish-brown mass of convoluted outline which moved in a limited manner. This was thought to be hemorrhage. The patient was hospitalized, and x-ray revealed a very small foreign body measuring approximately 1 by 1 by 1 mm. lying outside the globe on the nasal side, five mm. below the horizontal plane. On the nineteenth day following injury vision was 0.6 with a small plus correction, under atropin. The injection was a moderate ciliary blush. In addition to a few riders in the lower nasal quadrant, the lens for the first time was seen to have a fine stippling over a three mm. round area at the posterior pole. Eleven weeks after injury vision was 0.8—3. The posterior stippled polar opacities and most of the riders had disappeared, and the vitreous was clear.

This case was exceptional in that in traumatic cataract it is the rule that the opacity of the lens becomes total, spreading rapidly from the site of the wound in the capsule to the rest of the lens. Occasionally, however, cases are observed in which the opacity of the lens remains fractional or even disappears. In these cases the capsule wound must be very small, so that it may close quickly and the aqueous no longer have access to the lens fibers. Most favorably situated in this regard are those capsular wounds lying behind the iris, by adhesion of which to the wound the latter is very soon closed.

Discussion. DR. ROBERT VON DER HEYDT doubted if this small foreign body could penetrate the cornea, wound the lens, and then make its exit through the sclera. He would have a third x-ray taken. He had never known so small a foreign body (judging from the size of the corneal wound of entry) to have the momentum necessary for all this penetration.

DR. HARTLETT said that as the hemorrhagic area in the extreme nasal periphery disappeared a scar in the extreme nasal periphery could be seen in direct line with the other opacities in the media, which bore out the idea that the foreign body reached that area.

Traumatic inversion and recession of iris

DR. DEWEY KATZ presented a man 46 years of age, who when about six or seven years of age had been hit in the right eye with a piece of wood with sufficient force to knock him down. He did not remember how long it was before vision returned in the right eye. Unaided vision now was 1.0—4. The right iris was apparently almost entirely absent, except for a narrow rim of yellowish-brown color. There was no reaction to light. There was no pigment rim at the apparent pupillary margin. Slit-lamp examination showed the iris from 12 to 6 o'clock bending

sharply backward and nasally from the lesser circle for a distance of two to three mm., then again bending backward and temporally, making a groove of about 0.5 mm. width, the sphincter edge being attached to the anterior surface of the lens near the equator. The groove was widest and deepest at the three o'clock position, becoming narrow and shallow as it approached twelve and six o'clock, where it disappeared entirely; the former pupillary portion of the iris throughout its temporal half being inverted on itself. The inverted and recessive portions of the iris visible to the slit-lamp were markedly atrophic. The lens had numerous star-shaped pigment patches of persistent pupillary membrane near the equator, between six and nine o'clock, as well as numerous opacities near the periphery around the adult nucleus extending toward the center above and below. At no place were the zonular fibers ruptured.

Forester's explanation of inversion was as follows: After any blunt injury to cornea or sclera there is first a depression, and since fluid is scarcely compressible the size of the tunica fibrosa must be increased. This increases the tension at the same time, and thereby the eye contents tend to be expelled, i.e., lens, vitreous, etc. The bulb ruptures at its weakest point. When the blunt force dents the cornea the aqueous is pushed back against the iris, which gives way most easily near the iris root in a direction across the perilental space.

It was suggested that Dr. Katz's case proved an old rule—that the zonular fibers seemed to be very resistant in the first two decades of life. One would have expected subluxation of the lens in this case.

Retinitis pigmentosa

Dr. Vernon Leech presented a patient of whom he said that there seemed to be a difference of opinion as to whether the case was retinitis pigmentosa or choroiditis disseminata—the opinions being divided about evenly. The main points that would indicate retinitis pigmentosa were that there were no patches of choroidal atrophy in relation to the large amount of pigment present, also that the pigment was all superficial. It was not a typical case. In the nasal half of the left retina there was very little pigment in the periphery, but far more in the central portion and the temporal periphery. The macula being involved, the vision was approximately 5/200 in each eye.

Discussion. Dr. Peter C. Kronfeld, from a superficial examination of the left eye, was of the opinion that it was a case of retinitis pigmentosa. He could not see the extreme periphery, but saw a good part, which seemed to be nearly normal. The diffuse atrophy of pigment epithelium and inner choroidal layers typical of retinitis pigmentosa were plainly to be seen in this case. There was a series of methods whereby the functional difference between the eyes in retinitis pigmentosa and choroiditis disseminata might be studied, and we were told secondary atrophy of the optic nerve should be attributed to early retinitis pigmentosa. He suggested examination of the color sense, as in some cases progressive red-green blindness would be found in the early stage, which would be proof that the case belonged to retinitis pigmentosa.

Tapetoretinal degeneration of the retina

Dr. A. Spare read a paper on this subject which is published in this issue of the Journal, page 545.

Milk injections in gonorrheal ophthalmia

Dr. Irving I. Muskat read a paper on this subject which is published in this issue of the Journal, page 539.

Discussion. Dr. E. V. L. Brown said that he was interested in the use of milk injections, but since this therapy was first introduced in 1916 his opportunity for the study of cases of gonorrheal ophthalmia had been limited. Potassium permanganate irrigation had been used by him at the County hospital until 1917, and he had an experience of six years with clear corneas.

That treatment, while more protracted, was very successful.

Dr. Peter C. Kronfeld advised caution with the use of milk injections if there were deep corneal ulcers where perforation and prolapse of iris seemed unavoidable. In such cases the injections should be stopped unless the cornea showed other superficially progressive ulcers or the condition of the conjunctiva was very bad.

Dr. Muskat (closing) said that undoubtedly good results had been obtained with potassium permanganate irrigations. However, irrigations must be frequent and the other eye must be carefully shielded, and the method was long and tiring. The irrigations must be kept up night and day or else the morning might reveal a corneal ulceration from rapid digestion by accumulated pus during the night. One case in the series shown was proof of the difficulty encountered by this method. The patient, a boy of nine years, was treated in the children's venereal ward with hourly potassium permanganate irrigations for five days, but in spite of the intensive treatment there was a seemingly endless profuse purulent discharge from the infected eye. Twenty-four hours after the first milk injection there was a marked improvement, and the ophthalmia was soon controlled by further milk injections.

Clarence Loeb,
Corresponding Secretary

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

February 20, 1928

Dr. J. Leslie Bryan presiding

Chronic glaucoma

Dr. M. M. Cullom said that M. P., a colored female aged 40 years, had consulted him on October 1, 1926. Her right eye showed absolute glaucoma, the eye being stony hard, with complete loss of vision. The left pupil was widely dilated and there was a deep glaucomatous cup; and the vision was limited to hand movements. Tension by McLean tonometer was 75 mm. Eserine solution was prescribed and operation advised. The patient agreed to operation, but did not present herself until October 27, 1926. An Elliot trephine operation was performed on the left eye at Vanderbilt Hospital October 28, 1926. Recovery was uneventful.

On January 17, 1927, the patient returned on account of pain in her right eye. Enucleation was done on January 24, 1927. The patient reported from time to time that the vision was improving in the left eye. On December 8, 1927, vision was 20/30, or with correction 20/15. The perimeter examination showed the visual field to be absolutely normal, and the McLean tonometer registered the tension at 35 mm. The recovery of vision which followed the operation was a surprise. The comparative youth of the patient may have had something to do with it. Another unexpected thing was that there was apparently no filtering scar. Complete iridectomy had been done.

Discussion. Dr. Robert Warner said that in doing the trephine operation it seemed that Dr. Cullom had done an iridectomy, clipping the iris off at the root. He thought that deep iridectomy was the operation of choice. Iridectomy usually accompanied trephining.

Dr. Robert Sullivan said that the striking thing to him about this was that the field was normal. This was quite rare in glaucoma.

Dr. E. B. Cayce said that it would be natural to expect some contraction even after operation. There had evidently been very little cupping of the disc because this usually remained permanently. She had some unusual vessels towards the temporal side of the disc instead of towards the nasal side.

Dr. Herschel Ezell remarked that this was the first case of glaucoma he had seen in which the vision and field were normal. He thought that Dr. Warner struck the key note when he said that the unusually good result was due to complete iridectomy which had evidently been done early.

DR. CULLOM (closing) said that it had occurred to him also that he might have obtained the same result with iridectomy, but he was very much surprised to find that the patient had 20/15 vision with correction, and he was surprised to see that her field when taken today was normal. Previous to operation the sight had been so poor that no field of vision had been taken.

HERSCHEL EZELL,
Secretary.

SAN FRANCISCO COUNTY MEDICAL SOCIETY

Eye, Ear, Nose, and Throat Section

February 28, 1928

DR. WALLACE B. SMITH presiding

Ptosis cured by operation

DR. P. OBARRIO presented a case of paralytic ptosis of the right eye. The case had been progressing without blood findings for about seven years. Dr. Obarrio decided to perform Everbusch's operation, which consists in an advancement of the levator of the lid with retransplantation into the tarsus. Previous to the operation the lid covered the upper half of the pupil when the eye was opened as widely as possible.

Dr. Obarrio called attention to the fact that the three buried sutures must be firmly implanted in the tarsus after taking a good "bite" in the resected muscle. The patient was presented, showing perfect lid motion both on opening and closing and while looking straight ahead, at which time the level of both lids was the same.

Glaucosan in the treatment of glaucoma

DR. DOHRMANN PISCHEL reported on the results from glaucosan in a small series of cases. After outlining the different types of glaucosan and the method of their use, he reported that in his small group of cases two apparently showed untoward results in an increase in tension, two others had good temporary results but not permanent cure, whereas three showed very good results in that the tension had stayed down to a safe level, with no changes in field for some time. Two other cases, not included today, had good results from glaucosan, but as they could not be seen regularly they were not included in the report.

Discussion. DR. OTTO BARKAN agreed with Dr. Pischel in its temporary beneficial effects but thought that it was not without its dangers both direct and indirect. One case of high blood pressure with a bad heart developed alarming symptoms of decompensation in spite of precautions taken in instillation of the drops. There was a certain indirect danger, inasmuch as the indication for operative interference was rendered more complicated. The temporary good effect of the drug was apt to cloud the issue, which at best was often one for very delicate judgment, by giving the patient false hope as well as by deterring the doctor from proceeding with surgery in such cases as showed progressive loss in spite of the use of miotics.

It was, however, a distinct addition to our armamentarium, in that it enabled us to dilate the pupil and obtain an excellent view of the fundus in a glaucomatous eye. It might prove to have other advantages which further detailed studies, such as Dr. Pischel had made, would elicit.

DR. F. C. CORDES felt it would be valuable to dilate the pupil.

DR. W. F. SWETT had not had sufficient experience to discuss the action of glaucosan except for his experience with adrenalin, which seemed to be analogous. As we found in the use of glaucosan, it gave but temporary relief and in some cases it did nothing or delayed the usual routine. The dilatation of the pupil, which could be rapidly controlled by eserin, seemed to be of real value, especially in making an examination. This was due, he thought, to the fact that the tension was lowered, thus relieving the tension on the fibers of the short ciliary nerves which caused the paralysis and resulting noneffect of the eserin. This he had seen in recent inflammatory cases in which eserin had no effect until the tension was relieved by paracentesis,

and if the tension had not persisted too long, the oculomotor fibers gradually recovered and the eserin was now active. This would be superior to a painful paracentesis, if we could be sure of reducing the tension rapidly.

Dr. G. N. Hosford said that a very striking feature of Dr. Pischel's paper, and of the remarks of most of those who had discussed it, was the optimistic attitude towards operations. His observations and experiences with operations had not been so fortunate, and he welcomed most heartily any therapeutic agent that offered a possibility of relieving us of doing so many fruitless operations.

The idea of a "filtering cicatrix" was embalmed in the literature of ophthalmology long before Dr. Leo Eloesser performed his experiments on the lymphatics, and no ophthalmologist had since considered these striking experiments in relation to his work. Dr. Eloesser had clearly shown that if there was anything that prevented the flow of lymph, even in its natural channels, it was scar tissue. How much more certain was it to prevent lymph (or aqueous) flow in artificial channels not lined by endothelium! If operations for glaucoma had the degree of certainty that operations for appendicitis had this investigation of glaucosan would not need to have been undertaken.

Dr. Hans Barkan said Dr. Pischel was to be congratulated on his careful curves, showing the effect of glaucosan on those cases in which, evidently, pilocarpin and eserin had reached the limit of their action. None of us saw enough glaucoma patients in our practice to get together a great number of these curves in a short time and it was to be hoped that the two university clinics with their material would adopt Dr. Pischel's accurate method of measurement and present us with their results after a year or so.

He had used glaucosan on several cases, and he believed it to be of value for those in whom, for the sake of fundus examination, he wished to dilate the pupil without fear of rise of tension. Its effects to reduce tension, judging from the literature, were in the majority of cases after all not very permanent and it seemed to him that, while it might serve for some time after pilocarpin and eserin had failed, we were again presented with a new therapy of some value in glaucoma which was again only a stop-gap in order to be able to delay operation in very old people or in one-eyed people with very restricted fields. There was, to his mind, some danger that cases that had the best prognosis for some fairly long period of useful vision by prompt operation might lose that opportunity by losing actual time with glaucosan. How much longer to defer operation by the use of glaucosan would be a matter of very delicate judgment.

From the physiological standpoint Hamburger's theory that it acted by squeezing the blood out of the choroid as water could be squeezed out of a sponge was interesting. He carried his conclusions as regards the effect of adrenalin and glaucosan rather far along these lines in stating that he believed even the action of pilocarpin and eserin—which had, of course, an absolutely opposite affect on the pupil—was due to the fact that the iris became hyperemic and thereby pulled the blood out of the choroidal vessels. As the two systems of vascular supply were entirely different, this seemed hardly probable. When Hamburger went to the extent of claiming, as he did in his original papers, that the only effect of operations was to cause a hyperemia of the iris and thereby reduce the tension and that their effect on ocular drainage by scar formation was entirely secondary, one could see, he thought, a rather unbalanced enthusiast.

Dr. Kaspar Pischel said the great number of operations devised for the relief of glaucoma was a pretty sure sign that none of them was always successful and safe. Therefore the search for successful medical treatment of this difficult disease deserved encouragement.

Lately, Thiel, at the university of Berlin, had published very interesting experiments with ergotamin (on the

market as gynergen-Sandoz), which, taken by mouth or injected hypodermically, paralyzed the sympathetic nerve ending in the iris and reduced the tension. Thiel and other authors had reported good results in glaucoma.

This preliminary report was made to stimulate cooperation in trying out such remedies as had been successfully used abroad.

DOHRMANN K. PISCHEL,
Secretary.

PITTSBURGH OPHTHALMOLOGICAL SOCIETY

February 27, 1928

DR. E. B. HECKEL presiding

Neuroretinitis of unknown origin

DR. J. G. LINN presented the case of Mrs. M. M., who was first seen on February 7, 1927, complaining of failure of vision in her left eye which had begun about two weeks previously. Vision in the right eye was 20/40; in the left eye 20/100. Ophthalmoscopic examination of the right eye showed a large pigmented patch of choroiditis in the temporal field, with a similar patch below it. Ophthalmoscopic examination of the left eye showed the veins greatly engorged, arteries normal, general fundus edema, more marked in the disc region, and small hemorrhages scattered at various portions of the outer layers of the retina. The patient was admitted to the hospital for systematic study. On the advice of the medical department, she had all suspicious teeth extracted, and tonsils, gallbladder, and appendix removed. On her return to the eye clinic, a decrease in the retinal edema and hemorrhages was noted. No evidence of pulmonary tuberculosis was found. There was a slight constitutional reaction to 0.001 gm. of tuberculin, but no focal reaction in the eye. The nose showed some bilateral hypertrophy of the middle turbinates, but in the opinion of the laryngologist not enough to cause trouble. X-ray of the skull, blood Wassermann, and neurologic examination were negative.

Discussion. DR. EDWARD STIEREN thought the fundus picture in the right eye was that of senile arteriosclerosis, and that in the left eye the same with neuroretinitis engrafted upon it.

DR. C. L. REED thought on account of the condition being monocular the sphenoethmoid sinuses should be investigated even to the extent of breaking down the anterior wall of the ethmoid.

DR. ADOLPH KREBS would diagnose the condition of the left fundus as venous thrombosis with hemorrhages.

DR. E. B. HECKEL also thought the condition looked like venous thrombosis and that the picture was very suggestive of focal infection.

Retinochoroiditis with unusual fundus picture

DR. W. E. CARSON presented a farmer's daughter aged sixteen years, of interest because of the fundus picture and from the standpoint of etiological diagnosis. On awakening on February 1, she had noticed that her vision in the right eye was much impaired, a large part of the central field being obscured as by a curtain or dark object, although she could still see in the periphery of the field. This condition of the vision had continued practically unchanged to the present time. Two years ago the vision of the right eye was not so good as that of the left eye, but there was then no marked impairment.

On examination the vision of the right eye was found to be 4/60 eccentric, left eye 6/7.5 nearly. The right pupil was dilated and static.

With the ophthalmoscope, the outline of the right optic disc could not be made out. The retinal vessels lost their visibility at a variable distance from the nerve head. There was no measurable elevation of the disc. Downward and outward, beginning about one half disc diameter from the margin of the disc, was a large area, whitish, with a slightly greenish tinge, probably consisting of edema, and involving the lower part of the macular area. A few retinal vessels could be

more or less hazily made out around the margins of this area of edema, but below and to the temporal side the vessels were almost entirely obscured in a general haze. There were several smaller whitish areas to the temporal side of the large one.

Family and personal history, and x-ray and other tests of nasal sinuses, sella turcica, teeth, general physical condition, urine, and blood (including the Wassermann) were negative.

Discussion. Dr. Edward Stieren said the fundus picture was not the one that he associated with foci of infection. The latter came on violently and attacked the vascular elements. This case looked like a tuberculous condition.

Dr. Adolph Krebs thought it not unusual to see cases of exudative choroiditis such as this case. Far forward nasally was a periphlebitis which pointed to tuberculosis.

George H. Shuman,
Secretary

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

March 13, 1928

Dr. J. J. Shea presiding

Xerosis of the conjunctiva

Dr. P. M. Lewis presented C. F., colored female aged 40 years, who had been seen on February 28, 1928. She complained of a growth on the right eye, which caused no pain, but a feeling as if a foreign body were present. She claimed that the eye occasionally became red and the vision hazy. The growth was first noticed eight months ago and had slowly become larger.

On examination both eyes were normal in every respect except for a slightly raised white patch on the conjunctiva of the right eye. This spot was about seven by eight mm. in size, quadrangular in shape, and its inner extremity extended over the limbus for about two mm. on to the cornea. There was a greasy appearance of the white area and there was a small black spot at about its center. This white substance could be scraped off, and macroscopically had somewhat the appearance of boric acid crystals. Under the microscope, however, were found only degenerated epithelial cells and small club-shaped organisms which were considered to be exerosis bacilli.

The vision and field were practically normal. The blood gave a strongly positive test for syphilis and the patient was receiving anti luetic treatment, although lues probably had nothing to do with the eye condition. There was no history of an insufficiency or an imbalance of the patient's diet.

Discussion. Dr. E. D. Watkins thought that the lesion should be scraped and examined for calcium. He had recently seen two Chow puppies that had been shipped from China by slow freight, during which time they had been fed on vitamin free diet. In both the corneas showed xerosis and both puppies died within a short time.

Dr. Lewis (closing) said that the lesion had been scraped several times, but always regenerated.

Orbital infection

Dr. P. M. Lewis presented D. R., white female aged fourteen years, who was first seen on February 16, 1928. She complained of pain, swelling, and sensitiveness to light of the left eye. These symptoms had begun ten days previously and had gradually increased.

Examination showed chemosis and injection of the conjunctiva, most marked near the outer canthus. There was no mucus or pus in the conjunctival sac. A moderate degree of proptosis was present and the movement of the globe was limited in all directions, especially inward and downward. The eye was quite tender to pressure and a point of induration was felt at the upper angle of the orbit. The cornea was clear, iris normal, and pupil active. The media were clear and the fundus normal. Vision was O.D. 20/20, O.S. 20/30. The right eye was normal in every respect. Nasal examination showed nothing abnormal. X-ray pictures of the nasal sinuses and orbit

were normal. The tonsils were badly infected. Temperature was 99.5° F.

The patient was kept under observation for two days and, as all symptoms were increasing, she was admitted to the hospital and an incision made through the conjunctiva into the orbit at the upper outer angle, but no pus was found. The tonsils and adenoids were removed at the same time. Four days later, as the proptosis, chemosis, and so on were increasing, it was decided that an exploratory operation should be done to determine if the infection were not from the nasal sinuses, in spite of negative nasal findings and x-rays. An incision was made similar to that for a radical frontal and ethmoid operation, and the inner and upper bony walls of the orbit inspected back to the apex. No dehiscence in the bony plates or pathology of any kind was encountered. No mass could be palpated in the orbit.

Following operation, the condition of the eye had become worse. On February 22, a moderate degree of papillitis was first noticed. On March 1, the cornea was hazy and an exudate was seen in the anterior chamber, extending over the iris and the anterior surface of the lens. This exudate was so dense that light perception and the fundus reflex were both abolished. In less than thirty-six hours this exudate had disappeared and the eye looked clear again. The following day, the exudate formed and again disappeared as suddenly as it came. No pain was noticed by the patient. Atropin and hot compresses were used three times daily. The eye had continued to have recurrence and disappearance of this exudation every two or three days. The leucocyte count, frequently taken, had always been from 17,000 to 19,000. About 80 per cent were polymorphonuclears. The temperature had occasionally been as high as 102° F., but usually remained around 99.5° F. Foreign protein (milk) injections had repeatedly been given without causing any particular improvement. On March 5, the conjunctiva of the right eye became injected and slightly sensitive. No sign of a uveitis was present and the eye had become fairly quiet. The condition of the left eye, however, continued unimproved.

Discussion. Dr. Lewis Levy wondered if this might not be a mild cavernous thrombosis such as Dr. Eggleston had recently reported after undergoing resolution.

Dr. Lewis, closing, thought that this was certain to be a rupture of the ethmoidal cells into the orbit, but was at an absolute loss concerning the etiology, as all examinations seemed negative.

Hemorrhagic neuroretinitis

Dr. R. O. Rychener presented the case of Mrs. M. W. S., aged 43 years, who was seen one month after the birth of her eleventh child. She had a loss of vision in the left eye. The right eye was previously blind from glaucoma.

Examination showed vision to be 15/70 with correction. There were ciliary injection, a grilled figure in the cornea, and generalized edema of the disc and retina with small flame-shaped hemorrhages at the border of the disc. Laboratory examinations were essentially negative with the exception of positive Kahn reaction, which was being checked by a Wassermann reaction.

Bilateral detachment of the retina

Dr. R. O. Rychener presented the case of Miss V. L., aged sixteen years, who had slowly lost sight in the left eye two years previously and had experienced a similar loss in the right eye six months ago. A sister two years older was entirely blind following similar loss of vision five years previously. The father was very nearsighted, and the older sister had been myopic before her failure of vision. The patient also had a history of myopia, although she was able without glasses to drive a car shortly before failure of vision. Examination showed an inferior detachment of the retina in the right eye with a good reflex in the upper portion. Some fundus details were seen with a minus five. The left eye presented a total retinal detachment with tremu-

lousness of the lens and vitreous. Transillumination of both eyes was normal. Physical examination showed no defects of any kind.

Discussion. Dr. J. B. Stanford thought that the interesting thing in this case was that two members of the same family showed apparently the same condition.

Iritis treated with glaucosan: hyaloid remnants

Dr. R. O. Rychener presented the case of J. S., aged 25 years, who had been seen with an acute iritis two months previously, at which time many posterior adhesions were present which failed to yield with atropin. One administration of glaucosan resulted in wide dilatation of the pupil, rupture of the adhesions leaving multiple pigment spots on the anterior capsule. In spite of the wide dilatation of the pupil, three posterior synechiæ had again formed, which this time did not rupture after glaucosan.

A hyaloid remnant was present in the vitreous immediately in front of the disc, the anterior end being seen best with a plus 12 sphere. It could not definitely be traced to the disc because of the thinness of its posterior end.

Discussion. Dr. J. B. Stanford said that he was unable to trace the vitreous opacity to the disc, but that there was a dirty gray spot on the disc which he believed to be the other end of the remnant. The latter he believed to be hyaloid in origin.

Dr. P. M. Lewis wondered if Dr. Rychener preferred glaucosan to injections of atropin and adrenalin, and if so why.

Dr. Rychener (closing) stated that Dr. E. S. Ellett and he had used glaucosan in a great number of iritis cases, and that he personally preferred it to injection of atropin and adrenalin because of the ease of administration, it being necessary only to anesthetize the eye with a few drops of butyn or holocain and then drop in the cul-de-sac one or two drops of glaucosan. The patients, as a rule, dread the injection of anything about the eye when it is so acutely inflamed as in iritis. He thought, too, that glaucosan was superior in that it produced uniform dilatation of the pupil, one administration very often resulting in complete dilatation and rupture of all synechiæ, whereas in the injection of adrenalin the greatest effect was noted at the point of injection, and where multiple synechiæ were present it was necessary to make multiple injections.

M. G. Seligstein,
Secretary.

American Journal of Ophthalmology

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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INVITATION

to attend the International Ophthalmological Congress to be held in September 1929 in Amsterdam and the Hague (Holland).

In the name of the International Council and of the National Committee we have the honour to invite you to take part in the international ophthalmological congress which will be held in Holland in September 1929.

We beg to point out that members intending to read any paper at the congress should prior to the 1st of June 1929 address an extract, containing the principal conclusions, to the secretary Prof. Dr. Zeeman.

No communication will be admitted on any subject, unless the respective extract has been received by Prof. Zeeman not later than on the 1st of June 1929.

As you will see from the accompanying appendixes the subscription amounts to dutch Fl. 25.—.

We beg to invite you to apply for the membership as early as possible to the secretary of the National Committee: Prof. Dr. W. P. C. Zeeman, Wilhelmina Hospital, Amsterdam, Holland. Please remit your subscription to the treasurer Dr. H. M. Roelofsz, Managing Director of the Incassobank, 531 Heerengracht, Amsterdam.

Further communications concerning the meetings, symposia, accommodation, excursions etc. will be addressed to you in due course.

For the International Council:
J. VAN DER HOEVE, *Chairman.*
E. MARX, *Secretary.*

For the National Committee:
J. VAN DER HOEVE, *Chairman.*
W P. C. ZEEMAN, *Secretary.*

Editorial note: The above invitation, although addressed to a large number of American ophthalmologists, has apparently not come to the notice of all those for whom it was intended.

KEEPING UP GRADUATE STUDY

The most important institution for graduate medical study is the medical society; and among medical societies those devoted to ophthalmology rank high. Only those physicians who attend and take part in medical societies can get the education they afford. Study by reading is open to all; but many do not get much by reading. Without the inspiration and stimulus of personal contact they learn little and lose interest. Other methods and opportunities for graduate study are needed by every one who wishes to reach full development in his profession. Full success in medicine, as in other professions, depends on study continued throughout life.

To make up for defects in original preparation for ophthalmic practice it is generally necessary to restudy the fundamental branches. Anatomy, histology, physiology, pathology, and optics do not often appear on the programs of ophthalmological societies, and yet they can not be best studied by reading alone. They are laboratory studies; but the most important knowledge of them may be gained by those who cannot leave homes and practices in order to take the usual laboratory courses. Diagrams, models, and specimens are obtainable by the student of anatomy, and are most useful if kept at hand and referred to in connection with reading. But a most important practical part of the anatomy of the human eye is to be studied on the living eye, either on the eyes of patients, or on the student's own eye, by means of a mirror.

The biomicroscope offers a great opportunity for study of the anatomy and histology of the eye. Even the study of histology and histopathology in the usual way, by the examination of sections of the eye, is possible without leaving home or spending months in mastering laboratory technique. Every eye thoroughly examined by the pathologist affords a large number of serial sections. From these can be selected a few that will show the character and history of the lesions, and which may be kept in the pathologist's collection. But there remain a great number of sections that can be distributed among other students. The laboratory technicians can furnish large numbers of such sections that one can study in his own office if he has had the average laboratory training given in the undergraduate medical schools. Such collections of slides have been among the most valued possessions brought back by students from the famous medical centers of Europe.

By means of a simple projector, the demonstration of histologic structure and pathologic changes can be given to large classes of students. Or in small groups, each student having before him his own microscope with a slide under it, the teacher can call attention to characteristic conditions. The United States Army Medical Museum prepares specimens sent to it, has them studied by expert pathologists, and returns to the physician sending the specimen a report on it, and one or more slides showing the lesions found. These he can study with his own microscope and by the aid of books.

Physiologic optics is best studied by experiment, and the important equipment for the experiments may be furnished by the student's eyes and by his own trial case. The recent work of Cowan on ophthalmic optics offers the application of each principle or formula to the special example or experiment that illustrates it. The book of Burch on physiologic optics was based on experiments. It may be used as a manual for the laboratory, but home-made apparatus will make the experiments quite as educational to the isolated student. To think out and plan one's own experiments gives them their greatest value. In physiologic optics there is much need for graduate study and instruction. With a small amount of easily portable apparatus it is possible to demonstrate some fundamental facts and procedures based on them, wherever a few ophthalmologists appreciate the import-

ance of a scientific foundation for more than half their professional work.

The gap between what is known of physiology and its practical application in ophthalmic practice is one that most urgently calls for intensive thought on the part of practicing ophthalmologists. Among the fields for original research that open before the ambitious worker in science, this is now one of the most promising and the most likely to be fruitful of results. The nutrition of the eye, its relations to blood supply, to general nerve influences, to osmotic pressure on the one hand and to intraocular tension on the other; the mechanism of muscle action, both voluntary in the extraocular muscles and involuntary in the iris, ciliary muscle and choroid, or in the unstriated muscle cells distributed in the orbit, with essential relations to ocular disease; and the slow perversion of vital processes that produces the changes known as senile should all be studied from the scientific side, and thought of in connection with the needs of patients, by every man with a medical training who has engaged in ophthalmic practice. The eye, on account of its accessibility for examinations of many kinds, offers great advantages for the study of problems that lie on the border line of the practical application of pure science.

The time has come in the development of ophthalmology when younger men whose isolation from medical centers makes them self-dependent, and gives them opportunity to follow out their own lines of thought, should seriously take up the study of the basic sciences concerned with ophthalmology; and should prepare themselves to teach their colleagues what they have learned from books, teachers, and their own studies. Such student-teachers need no support from established institutions. They can gather the apparatus or specimens they require; and, doing the study needed to get a new grasp of the chosen subject, they will be prepared to use the opportunities for teaching the colleagues who need and can profit by such instruction. In national and local societies the need of such teaching is being recognized and provision is being made for it. Wider opportunities for making graduate study a part of the professional life of every specialist are opening steadily, and await the attention of the new generation of ophthalmologists. *E. J.*

GLAUCOMA AND THE LIGHT SENSE

The greatest hope for the successful treatment of any disease lies in its early recognition. This is the logical basis of whatever exceptional service may be rendered to the patient by the use of the slit-lamp in the early diagnosis of uveitis.

Unfortunately, most of the signs or symptoms upon which the diagnosis of glaucoma is based suffer from the disadvantage that by the time they can be detected the disease has already reached a stage at which it constitutes a serious threat to the future of the eye.

In a series of papers the latest of which was read before the Section on Ophthalmology of the American Medical Association in Minneapolis, Derby and his collaborators have emphasized the fact that the most effective means of limiting the damage from primary glaucoma must be found in earlier treatment, and that this in turn depends upon earlier recognition. It is further pointed out that one might naturally expect the first change in the potentially glaucomatous eye to be a defect in its physiological integrity, and particularly a dulling of its light sense.

It has been estimated that the human retina is three hundred thousand times more sensitive for dim light than the best modern radiometer, and further that the healthy retina has the ability to adapt itself promptly to extremes of illumination varying in the ratio of ten billion to one.

Yet for many years the various efforts made to analyze scientifically the pathology of the light sense have yielded conflicting results.

A number of the investigations pre-

viously made have, as pointed out by Derby and his fellow-workers, given inadequate attention to several variable factors which vitiated the comparative value of the conclusions arrived at. In dealing with the dark adapted eye it has not been ascertained that each patient entered the test with the retina adapted to a known level of light intensity, and no attempt was apparently made to allow for the pupillary diameter, although the amount of light admitted through the retina varies approximately as the square of that diameter. Other variable factors include the visual angle subtended on the retina, the wave length of light, the time of exposure, simultaneous contrast, and the retinal region involved (whether center or periphery).

The very elaborate series of studies in the light sense, of which a careful preliminary report was presented to the London Ophthalmological Convention in 1925, and of which the latest statement was made at Minneapolis, was carried on with special apparatus and technique, and was corrected by mathematical calculations, all designed to allow for these variables. The apparatus had a range of light intensity approximately in the ratio of 300,000 to one. For the expression of very low intensities a new unit was formulated called the "micromillilambert" (μ ml., one millionth of a millilambert), or 1/100,000 meter candle.

In studying the light sense, two distinct lines of investigation have been pursued, one measuring the smallest variation in illumination which could be detected by the light-adapted (or photopic) eye, the other applying itself to ascertain the light minimum, or light threshold, or in other words the minimum amount of light which could be perceived by an eye which was entirely adapted to darkness (the scotopic eye). The investigations here under review have sought to determine whether the preglaucomatous eye (the eye which was not yet glaucomatous but was disposed to the development of glaucoma) manifested variations from the normal of light sensitivity which could be demonstrated either as a reduction in the light difference (L. D., the smallest variation in light intensity recognizable by the light-adapted eye), or an elevation of the light minimum curve (L. M., light threshold, or minimum of light perceptible to the dark adapted eye).

Unfortunately, in spite of all efforts to standardize results and to eliminate or avoid every variable factor, the light differences disclosed a wide variability of readings not only as between different individuals but also as regards the same individual on different occasions. It is therefore concluded that tests of light difference are too variable and inaccurate to be of clinical value.

The rise in the light minimum curve is constituted on the one hand by a retardation of the normal rate of light adaptation, and on the other hand by an increase in the ultimate light minimum. As regards the employment of the light minimum as a clinical test the results were much more favorable than those concerning the light difference.

For several years every patient coming to the Massachusetts Eye and Ear Infirmary with "preglaucoma," that is, every patient who had primary glaucoma in one eye but whose second eye presented no clinical evidence of the disease, has been subjected to the light minimum test with the apparatus described in the year 1925; and the test has been repeated every six months until the diagnosis of established glaucoma could be made by the usual methods of tonometry and perimetry. Of those who have developed clinical glaucoma while under observation, the majority have shown an elevation of the light minimum curve.

Many of the patients whose light minimum had risen during the period of observation had not shown positive clinical signs of glaucoma up to the date of the Minneapolis report, but it was felt advisable to watch these patients most carefully in the follow-up work of the clinic, for experience with the test indicated that these patients were more likely to develop glaucoma than those whose light mini-

mum curve remained consistently low. In cases of incipient glaucoma, the rise in the light minimum curve was often found to be the earliest sign of the disease.

Since the apparatus so far employed by the authors is too elaborate for general use, the next problem is to devise some simpler but reliable means by which ophthalmologists generally may apply the test in the routine of daily practice. *W. H. C.*

RADIANT HEAT IN TRACHOMA

The fact that ultraviolet rays not only are invisible but can not be detected directly by any of the senses is probably in part responsible for the belief that they possess a greater therapeutic value than either the visible light rays or the infrared rays.

Although the ideas of many therapeutists as to the mode of action of spectral forms of radiation are perhaps somewhat nebulous, yet the general conception is probably that ultraviolet rays are relatively more and infrared rays less penetrating.

But precisely the opposite relative position as to the two kinds of radiation has been demonstrated by the experiments of Guillaume and others, as emphasized by Nichelatti in a paper on the use of infrared radiations in the therapy of some conjunctival affections, particularly trachoma (Annali di Ottalmologia e Clinica Oculistica, 1928, number 4, page 316). According to Guillaume, Nogier, and Hesselbach, a thickness of a half millimeter of skin suffices to block the passage of all ultraviolet rays, whereas by means of a galvanometer it was shown that not only did heat rays pass through the human body from back to front, but if the irradiation with infrared rays was stopped after ten minutes the temperature of the ventral area continued to rise for a minute or so and then decreased slowly, as occurred with the irradiated dorsal area.

The possibility that heat rays might have some beneficial action in trachoma was suggested to Nichelatti by the following experience: After seeing two children suffering from trachoma he found that the father of the children had a lid conjunctiva throughout which were distributed white, soft, smooth trachomatous scars, without a trace of hypertrophy or alteration in the tarsus; in other words, trachoma which had healed perfectly and in the best possible manner. A few days later another patient was found to present an equally satisfactory recovery from trachoma. Both of these adult patients were bakers, and hence were habitually subjected, especially as regards the eyes, to a great deal of heat.

A direct effect on the tissues and anatomic elements situated beneath the epidermis is only exerted by visible rays of light or by the infrared rays. The deep effects of infrared irradiation, that is of radiant heat, include a rise of temperature, and activation of plasmocellular interchange of the tissues which are placed in the path of the penetrating luminous bundles. This activation is probably connected with vasodilatation in the tissues of the area involved.

Whereas by means of hot compresses applied to the lids it is not possible to elevate the temperature of the conjunctiva much above one hundred and nine degrees Fahrenheit, and the temperature obtained in this way does not usually much exceed one hundred and two degrees Fahrenheit, much higher temperatures may be applied by means of radiant heat.

Nichelatti, who does not show any familiarity with the important work of Shahan along the general lines of thermotherapy, applied radiant heat in a number of cases of trachoma by means of the Paquelin electrocautery. Turning the upper lid well back, the heated cautery blade was held for three minutes about a half centimeter from the tarsal surface, parallel with the long diameter of the lid, the distance being momentarily increased whenever the patient experienced intolerable discomfort.

The conjunctiva was found to be very moderately sensitive to heat, al-

though the temperature of the conjunctival sac during the irradiation increased by ten to sixteen degrees Fahrenheit in the course of two minutes. While it was not possible to measure exactly the temperature of the conjunctival surface directly exposed to irradiation, comparative studies suggested that at the point at which the patient became intolerant of the heat the temperature of the conjunctiva directly irradiated was greater than 140 degrees Fahrenheit.

The conjunctiva thus treated showed in the first minute an intense hyperemia and beginning tumefaction, and within a short time the irregularities of the surface were brought to a common level. Later during the application there developed a serous transudate and numerous punctiform hemorrhages scattered throughout the conjunctiva.

The clinical results in eighteen cases which Nichelatti reports in detail, and which he was able to follow for a prolonged period after treatment, were remarkable. In every instance there was a notable objective improvement after the first few applications. In trachoma complicated by corneal ulcerations or infiltrations, with pannus, the method showed a great superiority over the chemical agents ordinarily employed. In the presence of papillary hypertrophy distributed throughout the conjunctiva, radiant heat, like many other therapeutic resources, led to improvement only after numerous applications; but when zones of hypertrophy alternated with scar tissue, the elevations disappeared after a few treatments, leaving a conjunctiva which was smooth, clear, white, and uniformly cicatricial, while the cicatricial changes connected with the cure were less than by other methods, and the tendency to relapse was much reduced. *W. H. C.*

Errata

In the June issue, page 467, column one, line 54, "Haab circular magnet" should read "Mellinger-Klingelfuss circular magnet."

In the May issue, page 421, in the abstract of a paper by Dr. H. H. Tyson, the word "not" should be omitted after "narrowing of the lumen does."

BOOK NOTICES

Saggi di Oftalmologia (Ophthalmologic essays, third volume, 1927). Paper, large octavo, 626 pages, 2 plates in colors and 145 illustrations. Rome, Tipografia Ditta F.lli Palotta, 1928.

This handsome paper-covered volume, of more than six hundred pages, freely illustrated in black and white, is issued as from the "Royal Eye Clinic of Rome, directed by Professor di Marzio," and is dedicated to Benito Mussolini, "maker of our renaissance."

The volume contains twenty-six papers on ophthalmologic subjects by fifteen workers in di Marzio's clinic. It presents unfortunately the very great defect of carrying absolutely no table of contents or index. At the end of the volume is a report on the functioning of the institution during the six months of reorganization by Professor di Marzio. This report is a very frank statement of a previously run down condition of the clinic and its teaching equipment, and of the reorganization recently effected, in spite of an enormous reduction in the funds provided for its maintenance.

The roentgenotherapy of ulcerous keratitis is discussed by Professor di Marzio and Dr. Salvatori, with nine figures illustrating the conditions present in that many cases, and a tabular summary of forty-six cases. A paper on the roentgenotherapy of parenchymatous keratitis is illustrated by the appearance in seven cases and a tabular summary of fifteen cases. A paper on serous cyst of the iris by Dr. Caramazza is based on the observation of three cases. The paper by Dr. Cattaneo on the parenchymatous keratitis of hereditary lues, largely a study of cases by biomicroscopy, is illustrated by two colored plates and seventeen figures, and is based on 111 cases. All of the papers are accom-

panied by lists of references, or by bibliographies. The illustrations of the histopathology of the different cases reported constitute a striking feature of the volume.

E. J. and W. H. C.

Ars Medici, the journal of the American Medical Association of Vienna. Editor, Dr. M. Ostermann. Volume 5, 1927. Subscription price in the United States $3.00.

This journal, modestly referred to in an accompanying circular as one of the best medical journals of the world for the general practitioner as well as for the specialist, and further described as the only English medical journal appearing on the (European) continent since 1923, is a monthly publication consisting chiefly of abstracts in English from European medical journals, such abstracts being classified according to the medical specialties. There are also a few original articles and a rather extensive monthly series of questions and answers on a wide variety of medical topics. *W. H. C.*

The Springtime of Physick. Laurance D. Redway, M.D. Cloth, 68 pages. The Free Press Printing Company, Burlington, Vermont.

Anyone with a taste for humor with a sarcastic tinge can spend a very pleasant hour in reading this book by a fellow ophthalmologist. True, the humor is at times a little forced, and ther reader might feel that some of the "digs" are unmerited, but the man who writes a book can always retort: "Write a better one." This one is a pseudoreview of the history of Medicine from Asklepias (?) to Galen. The author pays his respects to medical and pseudomedical cults, faculties of medical schools, prohibition, research work, public commissions, etc., but so goodnaturedly that the thinnest skinned person could not take offense. *C. L.*

CORRESPONDENCE

"Eye physician" or "Eye Surgeon"

To the editor:

I am interested in the endeavor of the Guild of Prescription Opticians of America to find a designation for doctors of medicine specializing in the eye which shall clearly differentiate between this group and all nonmedical persons dealing with the eye, mainly in the field of refraction. Formerly the term "oculist" signified an M.D. practicing ophthalmology. Today this term seems to be applied, or has been assumed, by some nonmedical eye testers. The word "ophthalmologist" still, to the best of my belief, signifies an M.D. specializing in the eye.

You are aware how frequently the title "doctor" is misapplied. It has even been proposed that the title be wholly abandoned by doctors of medicine, and that instead the designation "medicus" be used. (You know the Germans use the form "Dr. Med. Schmidt," thus setting him apart from Dr. Phil. Schmidt—doctor of philosophy Schmidt.)

The suggestion "eye physician" has merit. "Physician" connotes to most laymen a "doctor of medicine." It may be objected that the expression is awkward, perhaps ungrammatical, and that the noun "physician" should not be qualified by another noun "eye," but by an adjective such as "ophthalmic" or "ocular." Of course, the word could be hyphenated—"eye-physician."

Though having some doubts as to the entire propriety of the term, I made use of it in an address delivered before the Kansas Medical Society, the audience being made up largely of general practitioners. It seemed that every one immediately grasped the true significance of "eye physician," and it seemed much easier to drive home the point that an "eye physician" could mean none other than a medical practitioner specializing in ophthalmology.

As a result of this experience I am much more inclined to believe that the term is a very useful one and should find general acceptance.

St. Louis. *John Green.*

ABSTRACT DEPARTMENT

Abstracts will be classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases, including parasites
18. Hygiene, sociology, education and history

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5. CONJUNCTIVA

Dusseldorp, M. **Trachoma in northern Argentine.** Arch. de Oft. de Buenos Aires, 1928, v. 3, no. 4, Feb., p. 204.

The author has recently concluded a survey of trachoma in northern Argentine, and finds in some of the more isolated villages that the infection is present in an alarming percentage of the inhabitants. All the usual complications were found, as well as the various clinical types of the disease.

Several charts are appended showing the age of distribution. The infection was found even in the first year, with a gradually increasing incidence, reaching its maximum in the eleven to twenty year group. Thence it declines rather rapidly to fifty years, although still present in the eighty-one to ninety year group. Females show a slightly higher incidence. Pannus showed a constantly increasing incidence with age.

The author speaks of the ignorance and general insanitary conditions in which so many of these people live. The region is quite arid, and cleanliness difficult owing to lack of water, even should the desirability of baths become recognized. The author advocates systematic teaching of hygiene in the schools, distribution of pamphlets giving the salient features of the disease in simple language, establishment of adequate water supplies, the formation of separate classes for trachomatous children in school, and intensive public health work.

A. G. Wilde.

Gasteiger, Hugo. **Involvement of the anterior segment of the eyeball in erysipelas.** Archiv Oftalmologii (Russian) 1928, v. 4, p. 1, p. 56.

Two cases of involvement of the anterior segment of the eyeball in erysipelas are described. In the first one erysipelas originated in the bulbar conjunctiva and manifested itself in a chemosis of a yellowish tint and in numerous hemorrhages. It later spread over the skin of both eyes. In the second case erysipelas of the eyelids was complicated by a corneal involvement resembling herpes, and by a mild plastic iritis. A hemolytic streptococcus was isolated from the corneal lesion.

M. Beigelman.

Gonzalez, J., Lelong, and Dusseldorp, M. **A case of primary tuberculosis of the conjunctiva.** Arch. de Oft. de Buenos Aires, 1928, v. 3, no. 3, p. 140.

This was a case of mixed vegetative and ulcerative tuberculous lesion of the conjunctiva, with preauricular periadenitis. The diagnosis was confirmed by typical pathological findings.

M. Beigelman.

Morax and Couvelaire. **Gonococcal conjunctivitis in a newborn child delivered by Cesarian section.** Bull. Soc. d'Opht. de Paris. 1927, p. 224.

The child was delivered by cesarian and one eye later became infected with gonorrhea. The mother had some discharge since the eighth month of pregnancy. Rupture of the membranes occurred two and a half hours before delivery. The authors point out that instillation of silver nitrate should be done even after delivery by cesarian. In the discussion De Lapersonne criticised the use of argyrol, protargol and other remedies except silver nitrate for protection of the eyes. It was also pointed out that the infection was noticed only after the fifth day, whereas the period of incubation following inoculation during vaginal delivery is generally about twelve hours. Infection may be produced directly within the uterus, when the membranes are ruptured. *A. G. Wilde.*

Pokrovsky, A. Y. **Pathological changes of the scleral conjunctiva in trachoma.** Russkii Ophth. Jour., 1928, v. 7, April, pp. 409-446.

In seventy-seven cases of trachoma, the scleral conjunctiva has been examined pathologically. While the conjunctival epithelium shows very early a tendency to epidermalization, the important changes occur in the subepithelial tissue. They consist of a proliferative inflammation followed by the formation of connective tissue. This early cicatrization and not the abundance of plasma cells in the infiltrate is characteristic for trachoma of the bulbar conjunctiva. Since these changes are identical with the pathology of pannus, the latter possibly is due to direct continuation of the trachomatous process from the palpebral conjunctiva to the cornea.

The pathological changes in the scleral conjunctiva are more pronounced in the superior part of the eyeball, and they are partly responsible for the relapses of pannus and of trachoma in general. *M. Beigelman.*

Vica, Mandicevski. **A rare complication of gonorrheal conjunctivitis.** Zeit. F. Augenh., 1928, v. 64, Feb., p. 149.

Report of a case of the rare complication described by Fuchs in the earlier edition of his text, in which the cornea, without previous opacity, melts away like ice in the sun. Probably a chemical change in the corneal stroma is brought about by toxins.

F. H. Haessler.

6. CORNEA AND SCLERA

Fischer, Franz. **Embryology of the cornea.** Zeit. f. Augenh., 1928, v. 64, March, p. 293.

In this study of the cornea of six human embryos twenty to twenty-four mm. in greatest length, the author discusses his own findings in relation to the published works of others. The paper does not lend itself to abstract.

F. H. Haessler.

Lacaz, H., and Bidault, R. **The rôle of subconjunctival hemorrhage in posttraumatic syphilitic interstitial keratitis.** Arch. d'Ophth., 1928, v. 45, Feb., p. 103.

Four instances are reported of patients affiicted with syphillis who developed an interstitial keratitis immediately following an injury which caused a subconjunctival hemorrhage. The theory is advanced that the localization of a large amount of infected blood around the cornea caused its invasion by the infectious agent.

M. F. Weymann.

Strughold, H. **Sensibility of the cornea and conjunctiva in the normal human eye.** Zent. f. d. ges. Ophth. u. i. Grenz. 1928, v. 19, Feb. 21, p. 353.

Strughold reviews the work done on the sensibility of the normal cornea and conjunctiva and records his findings. The central portion of the cornea is highly sensitive to pain but does not react to pressure, cold or heat. The periphery of the cornea, especially near the limbus, is much less responsive to pain but extremely sensitive to cold. The bulbar conjunctiva is mildly sensitive to pain and cold, while the palpebral portion responds weakly to pressure, pain, heat, and cold; the caruncle being strongly positive to pressure. Pressure, heat, and cold are

highly developed in the skin of the lids, while the reaction to pain is slight.

Much remains to be done in determining variations of this sensibility under pathological conditions.

Frederick C. Cordes.

Velhagen, K. **Experiments with herpes virus in the transference of infection from eye to eye.** Graefe's Arch., 1927, v. 119, p. 325. (See Section 7, Uveal tract, sympathetic disease and aqueous humor.)

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Birnbacher, T. **Acute primary iris necrosis.** Zeit. F. Augenh., 1928, v. 64, March, p. 227.

Secondary iris necrosis following necrosis of intraocular sarcoma, circulatory disturbances with increased tension, or iridodialysis due to direct trauma, is well known. Meller has called attention to the iris necrosis of herpes zoster, but only one case has been reported of iris necrosis without any demonstrable cause. Birnbacher reports a second case. The eye was enucleated because of a possible intraocular tumor. Histological study revealed necrosis of the iris tissue without cellular reaction and without involvement of the bloodvessels, which were overfilled with red cells—a picture which Fuchs has pointed out is characteristic of toxic destruction of the iris. There was also necrosis of the part of the lens surface exposed in the pupillary area, of the surface of the ciliary body, and of the rods and cones in the anterior third of the retina. The ciliary nerves were normal. From the herpes zoster necrosis described by Meller this case differed only in that there were no infiltrates about the nerves. In spite of this variation, it is possible that this necrosis was neurogenic, and the author knows no other explanation. He appends another case in which typical toxic necrosis was found in an eye enucleated because of glaucoma.

F. H. Haessler.

Hausen, R. **Membrane formation on the anterior surface of the iris.** Zeit. f. Augenh., 1928, v. 64, March, p. 278.

The author reviews the literature on the formation of homogeneous membranes on the anterior surface of the iris, and presents what evidence he could obtain from the histological examination of ninety-four eyeballs. It seems to him that all his observations can be considered as stages of a unified disease process beginning with changes in the anterior surface of the iris and leading to formation of the homogeneous membrane. He thinks that proof is lacking that cells wander from the posterior corneal surface to the iris and produce a vitreous membrane there. Most of the eyes in which glassy membranes are found are glaucomatous, and possibly there is a causal relationship. *F. H. Haessler.*

Will, Heinz. **Iritis and optic neuritis in Weil's disease.** Zeit. f. Augenh., 1928, March, v. 64, p. 222.

Weil's disease starts with fever and manifestations of grippe, followed by severe icterus, swelling of the liver and spleen, and involvement of the kidney. The ocular complications are chiefly conjunctivitis and iritis. The latter occurs in the second week and in forty-four per cent of the patients, and often produces vitreous opacities but rarely hemorrhage in the retina. A single case of optic neuritis which healed rapidly has been reported. Of this affection the author reports another case which healed with a return of visual acuity to six-eighths. The disease is probably not transmitted from man to man, but the rat acts as intermediate host. The spirochete is excreted in the urine, and it is probable that Will's patient was infected while swimming in a river. *F. H. Haessler.*

Montalti, M. **Experimental tuberculosis of the iris.** Ann. di Ottal., 1927. v. 55, July-August, pp. 555-577.

In the author's first series of experiments, rabbits were inoculated intravenously with tubercle bacilli, and vari-

ous forms of traumatism applied to the iris, such as iridectomy, lacerating wound, and injection of weak acid into the anterior chamber. Although the animals developed pulmonary tuberculosis, none showed foci of tuberculosis in the iris. In a second series, rabbits were inoculated in the anterior chamber with tubercle bacilli which had been irradiated with the quartz-light, untreated bacilli being injected into the other eye. Iritis with tubercle-formation developed in both cases, but in the eyes inoculated with irradiated organisms, the nodules remained small, were limited to the iris, and showed little tendency to caseation and necrosis, while in the control eyes the cornea and ciliary body were involved, and there was marked caseation and necrosis. Some eyes showing nodular iritis as the result of inoculations with virulent organisms were submitted to varying doses of irradiation with the quartz light. A reaction was produced which left no permanent scarring but which caused rapid absorption of the tubercles. A third series of experiments was devoted to the anaphylactic phenomena produced by introducing living tubercle bacilli or tuberculin into the anterior chamber of rabbits previously sensitized by intravenous injections of bacilli. While such injections in normal animals produced only slight reactions, the injections in sensitized animals produced very severe reactions which in the case of those injected with tuberculin ended in rupture of the globe. *S. R. Gifford.*

Thompson, Ernest. **Unilateral chronic anterior uveitis in children.** A clinical note. Brit. Jour. Ophth., 1928, v. 12, April, p. 189.

This condition the author has observed in ten cases which he tabulates. The most outstanding feature is unilaterality. The signs of uveal tract disturbance are presented unaccompanied by any fundus changes or iritis. Chronicity is another striking feature: only one of the series appeared to be cured. One case developed retinal detachment in later years. The chief difficulty in prognosing the ultimate outcome in a given case is its chronicity. We do not know what form of adult eye disease follows this juvenile commencement. *D. F. Harbridge.*

Velhagen, K. **Experiments with herpes virus in the transference of infection from eye to eye.** Graefe's Arch., 1927, v. 119, p. 325.

The author succeeded in causing inflammatory disease of the fellow eye in twenty per cent of rabbits inoculated in the ciliary body with herpes material according to Szily's method. By modification of the technique, it was possible to observe frequently with the ophthalmoscope a papillitis several days after the occurrence of the iridocyclitis. In none of the cases in which the second eye became affected was papillitis absent in the first eye, in fact it preceded by at least four days the uveitis of the second eye. In the involvement of the second eye three types of changes could be differentiated, (a) a primary papillitis (associated eventually with iridocyclitis), (b) primary (plastic) iridocyclitis, (c) corneal herpes. It is probable that these different pictures occur by reason of different pathways of transfer of the infection. Either a migratory transference occurs through the optic nerves with their sheaths as well as through all the other ocular nerves with their coverings, or a metastatic transmission takes place through the blood.

The herpetic intraocular inflammation is largely uveal, affecting first the iris and ciliary body and second the choroid. In no case where disease of the fellow eye occurred was an extensive encephalomeningitis absent.

The author therefore agrees with Szily in regarding experimental endogenous transference of the infection from eye to eye as typical of true sympathetic ophthalmia. The intraocular herpetic disease produces changes very similar to those in man, including postherpetic vitiligo and herpetic hemorrhagic iritis. *H. D. Lamb.*

8. GLAUCOMA AND OCULAR TENSION

Davies, D. L. **Chronic glaucoma.** The Lancet, 1928, April 7, p. 699.

The importance of early diagnosis is emphasized, because the writer is convinced that if chronic glaucoma is taken in hand early there is every probability that vision can be permanently saved. Chronic glaucoma occurs almost equally in the two sexes, 79 males to 76 females. The age ranges generally from 50 to 86 years, nine being under 50, the youngest 26 years old. Debilitating illness, financial worries, and close attention on a sick relative are predisposing causes that should lead the practitioner to keep chronic glaucoma in mind. Difficulty in reading, demanding frequent changes of glasses, is a characteristic symptom. Transient dimness of vision and weariness on attempting to read are others. Contraction of the field of vision, slight haziness of the cornea, and dilatation of the pupil should lead to use of the tonometer and of the ophthalmoscope. Davies is fully persuaded that, once the diagnosis is made, the earlier operation is performed the better will be the result. Even with greatly diminished vision a useful amount may be retained permanently. Davies favors trephining and makes bold to say that the great majority of cases of chronic glaucoma can be saved by this operation. Of one hundred cases operated upon for chronic glaucoma, in private practice, the sight has been retained in ninety-one. In the future other methods may become available, but to place confidence today in any other method than operation is to risk the loss of sight which might have been saved. *E. J.*

Lewis, J. B. **Neglect of glaucoma.** Med. Jour. Australia, 1928, Feb. 25, p. 232.

Of eight cases of glaucoma, in which failing vision had been noticed for periods ranging from nine months to eight years, four were entirely blind in one eye before relief was sought. This attitude is accounted for by the fact that "some think that a gradual loss of sight is one of the accompaniments of the onset of old age, and they do not worry about it." Erroneous diagnosis is another cause for neglect. In three months eight eyes were examined that had been allowed to go blind whereas early operation would have prevented this. The patient is told by an optician or a medical practitioner that he has cataract, and that he must wait for it to become ripe before it can be operated upon. This fault in diagnosis is still very frequent. Students of ophthalmology need to have it hammered into them never to make the diagnosis of cataract except with proper light and mirror. Even the pain of glaucoma may be ascribed to some other condition, in which case the optician who refuses to do anything may be in a more creditable position than the physician who is willing to palliate with ineffective treatment.

The treatment Lewis advises for acute cases is morphine, hot baths, purgation, hot fomentation, and eserin. After the pain subsides he operates; trephining in all patients both acute and chronic. The results have been good in all but very advanced conditions, for which nothing does good except excision. Posterior sclerotomy is used in painful eyes and sometimes a filtering scar follows. *E. J.*

Lambert, R. K., and Silbert, S. **Effect on intraocular pressure of intravenous injections of hypertonic salt solution.** Jour. Amer. Med. Assoc., v. 90, p. 1435.

In the treatment of thromboangiitis by intravenous injections of hypertonic sodium chloride solution, the effect of such injections on the intraocular pressure was observed in a series of male patients whose general condition approached normal. In twenty-two cases the five per cent salt solution was used. This was injected into the arm veins by the gravity method, the duration of injection being between five and ten minutes. The tension of the eyeball was then taken every five minutes with an improved Schiøtz tonometer. In every case there was a definite drop in intraocular pressure, palpable with

the fingers and measurable with the tonometer. The average fall after the injection of 300 c. c. of sodium chloride solution was forty per cent of the original pressure. After the injection of 150 c. c. of five per cent sodium chloride the average fall was twenty-one per cent. In practically every case, the maximum drop in pressure had occurred within forty minutes; and it had returned to its original level in from one to two hours. Judging even from this limited series, a relationship between the amount of sodium chloride injected and the degree of fall of intraocular pressure seems to be quite definite. In three cases a twenty-five per cent solution of dextrose was used and the intraocular pressure observed in the same way. In these the reduction of pressure was not so great, being on the average seventeen per cent.

E. J.

Safar, Karl. **Basal iridectomy for glaucoma.** Zeit. f. Augenh., 1928, v. 64, Feb., p. 130.

The author calls attention to basal iridectomy, not because it is a new procedure but because it is used less than it deserves. It causes less primary injury to the eye, with less danger of expulsion of lens and vitreous, than a broad total iridectomy. The small opening is immediately closed by presenting iris tissue as in Elliot's operation, producing more gradual decompression. There is less danger of late infection than after trephining, the cosmetic result is better, and the round pupil gives better vision than the large irregular opening after total iridectomy. The operation should be limited to primary glaucoma with adequate motility of the iris. *F. H. Haessler.*

Schiøtz, I. **The diastolic pressure in the central retinal artery.** Acta Ophth., 1927, v. 5, nos. 1-3, pp. 293-297.

I. Schiøtz observed six patients suffering from secondary glaucoma, all of whom showed pulsation of the central artery. The diastolic and systolic pressures of the retinal artery as found by several different observers are tabulated. In the author's experience pulsation is first observed when the intraocular pressure reaches 55 mm. (Schiøtz-new curve) and is first observed on the nerve head. If the pressure rises to 60 mm. or higher the pulsation extends farther out into the retina. In two cases in which the brachial blood pressure was between 70 and 110 mm. retinal arterial pulsation was observed when the intraocular tension was only 48 to 50 mm.

E. M. Blake.

Seidel, Erich. **Clinical research in glaucoma.** Graefe's Arch., 1927, v. 119, p. 15.

Seidel has thirteen cases of primary chronic glaucoma, on which over 250 single observations have been made. The thirteen patients varied in age between forty-three and sixty years; their blood-pressure was generally 120 to 130 mm. Hg. All had exceptionally shallow anterior chambers. It was found that if these individuals were placed for an hour in an entirely or half darkened room the intraocular tension would increase from normal to sometimes as high as sixty to eighty mm. After the eyes were again exposed for one-half to three-quarters of an hour to strong daylight or artificial light, the intraocular tension returned to normal. These changes in tension must be dependent upon the changes in size of the pupil. *H. D. Lamb.*

Szymanski, J. **The half Elliot operation .in theory and in practice.** Arch. d'Opht., 1928, v. 45, Feb., p. 97.

The operation described is one of the fistula-producing type for the relief of glaucoma. A conjunctival flap is dissected down and a three mm. trephine with a centering needle in it for fixation is used in the following manner: The needle is introduced into the anterior chamber under the flap at the limbus and is kept parallel to the iris while the trephine is rotated. In this manner only the upper half of the button is cut through, and this half is freed by snipping it off with scissors or a scleral punch. The advantages claimed are: lessened danger of injury

of lens or ciliary body, slow withdrawal of aqueous, and perfect control of flap and simplicity of technic.

M. F. Weymann.

9. CRYSTALLINE LENS

Chiazzaro, Domingo. **Infection of crystalline lens with spores.** Ann. d' Ocul., 1928, v. 165, Mar., pp. 183-196.

Experiments were made on rabbits by injecting the crystalline lens with various spores, especially B. mesentericus, B. sporogenes, B. œdematiens, and B. subtilis. Among the author's conclusions are the following: The crystalline lens offers a particularly favorable ground for the development of spores. The vitality of the spores is preserved for a long time in the lenses of rabbits. A possible relationship between late postoperative infections and the presence of spores is pointed out.

L. T. P.

Dejean. **Researches upon the zonule of Zinn, its development, structure, topography, and physiology.** Arch. d' Opht., 1928, v. 45, Feb. and Mar., pp. 65 and 145.

A complete review of the literature upon the development and anatomy of the zonule is given. The zonule is considered as a central portion consisting of thin membranes containing and reenforced by the fibrils with which we are familiar. Ordinary technique did not show the membranes, as they were not easily stained. The second portion of the zonule was found to consist of two walls of transparent elastic tissue, the anterior was a portion of the hyaloid membrane and formed the posterior boundary of the posterior chamber. The posterior layer was an intervitreous layer upon the posterior surface of the zonule. The theory of accommodation advanced is that the pockets of fluid in the zonule between the anterior and posterior walls were compressed by contracture of the ciliary muscle and engorgement of the ciliary processes. Thus by hydraulic pressure the lens was compressed at its equator and bulged forward into the pupillary space. Excellent illustrations are published with the article. *M. F. Weymann.*

Gil, Romulo R. **Familial microphakia.** Arch. de Oft. de Buenos Aires. 1928, v. 3, Jan., p. 136.

Two cases are described, in brothers aged nine and fourteen years.

The older boy's lens was very small and practically a sphere in shape, and, as it was displaced forward, the resultant myopia was approximately fifty diopters. The lens was clear. The fibers of the zonule were abnormally elongated, which allowed the lens to become approximated to the posterior surface of the cornea. The fundi were normal. While there was no consanguinity of the parents, the father was definitely syphilitic, and both the children bore all the usual stigmata of hereditary lues.

As the refractive error was so enormous, its correction by lens was not regarded as practicable. A discission was first attempted, but, as the lens was so mobile and the capsule abnormally resistant, this was unsuccessful. The lens was therefore extracted in toto.

The second case had a myopia of twenty-five diopters, but was apparently not operated upon. The author believes this developmental defect arises from the luetic taint inherited from the father. *A. G. Wilde.*

Sédan, Jean. **Juvenile cataracts with large nuclei in healed tuberculous patients.** Ann. d'Ocul., 1928, v. 165, Mar., pp. 201-203.

Two cases in patients in their teens are reported. The nuclei measured in one seven and in the other six millimeters in diameter, the former two and one half and the latter three millimeters in thickness. Successful extractions were performed, following which vision was 0.7 in one and 0.6 in the other. The cataracts were a brilliant white. *L. T. P.*

10. RETINA AND VITREOUS

Argañaraz and Adrogué. **Hereditary degeneration of the macula.** Arch. de Oft. de Buenos Aires, 1928, vol. 3, Feb., p. 193.

Three cases are reported of familial degeneration of the retina, all showing the usual signs, and all related. The literature is reviewed and the various explanations of origin and pathology taken up. Three excellent plates in color show the conditions presented. The article concludes with a review of the Mendelian principles of heredity.

A. G. Wilde.

Pavia, J. Lijo. **General pathological manifestations in the macular region.** Rev. Oto-Neuro-Oft., 1928, v. 11, Feb., p. 49.

The general physiology and anatomy of the macula are discussed, its vulnerability to local pathology being emphasized. Red-free light is regarded as of the greatest utility, not only to examine the general structures of the retina, but especially to determine the presence of the normal reflexions throughout the macular and foveal regions.

The fovea itself is likened to a concave mirror, possessing its catoptric properties. Its reflexions arise from the internal where this approximates the external limiting membrane, the retina being thinnest at this point.

These normal reflexions are not visible with ordinary light, but become very evident with red-free. When so examined the macula is seen surrounded by a ring of light situated at the border marking the edge of the depression. Another reflexion is visible at the bottom of the fovea, which is the deepest portion of the concavity.

It is evident that any alteration in the retinal surface at this point must modify more or less profoundly the size and shape of these reflexions, causing them either to be broken up, to assume irregular shapes, or to disappear altogether. The general causes are edema, inflammatory remains, scars, folds in the retina, and cystoid degeneration. This method of examination affords a means of diagnosis that is applicable to the macular region only, as the slight surface irregularities sufficient to produce changes in the normal reflexions elsewhere would cause no noticeable alterations. Any collection of fluid under the internal limiting membrane, however slight, is sufficient to interrupt the perfect concavity of its surface, and becomes demonstrable under red-free illumination.

A. G. Wilde.

Pavia, J. Lijo. **Treatment of pigmentary degeneration of the retina.** Rev. Oto-Neuro-Oft. y de Cir. Neurol., 1928, v. 2, Jan., p. 9.

A case of pigmentary degeneration is reported which was clinically identical with others of the same condition, and the diagnosis was confirmed by Prof. Fuchs. The patient, a twenty-two year old woman, had noticed decreasing vision for the past two years, and upon examination the acuity was greatly decreased bilaterally, the visual field was markedly constricted, and there were in addition bilateral lenticular opacities sufficient to interfere considerably with fundus examination.

Although the Wassermann was negative, intensive antiluetic treatment was given with cyanide of mercury and bismuth. Within two months the left eye had improved considerably in visual power. While the author does not draw absolute conclusions from the single case presented, he believes that, as we have no other form of treatment that proves at all effective, vigorous antiluetic measures should be tried.

A. G. Wilde.

MacGillivray, A. M. **Recurrent intraocular hemorrhages.** The Lancet, 1928, March 31, p. 651.

Such hemorrhages into the retina and vitreous, first described by Henry Eales in 1880, are often designated "Eales's disease." Some cases are tuberculous, but in others the etiology and essential nature remain obscure. In the case here reported the first hemorrhage occurred at the age of twenty-eight reducing the vision of the

left eye to light perception. No cause for it was found except that the coagulation time of the blood was lowered. It was six months before a clear view of the fundus could be obtained, revealing bands of fibrous tissue and new-formed vessels. Vision was then 6/60. Two months later there was a new hemorrhage, and this recurred each month for a year. Then the patient was found to have detachment of the retina. Two years later he had impairment of vision in the other eye, which culminated in sudden blindness. This eye also presented bands of fibrous tissue and new-formed blood vessels. In the interval (with a negative Wassermann) the patient had analgesia and anesthesia of the right side, diagnosed as due to hemorrhage into the spinal cord in the lower cervical region. Detachment of the retina in the second eye seemed probable.

E. J.

Menacho, M. **Interesting affections of the retina.** Arch. de Oftal. Hisp.-Amer., 1926, v. 26, Nov., p. 613.

The author gives a general résumé of retinal affections, followed by case histories and drawings demonstrating many of the points covered. Most of the material is a compilation of facts already well known in reference to the retina and its disorders.

A. G. Wilde.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Fileti, A. **Embryology and morphology of the optic canal.** Ann. di Ottal., 1927. v. 55, July-August, pp. 493-554.

In serial sections and by reconstructions the author has studied embryos from the end of the first fetal month to term, and cadavers from birth to the age of twelve years, his work being illustrated by fifty photomicrographs and reconstructions. The beginning of the optic canal may be found in embryos of the second month. Its development may be divided into three stages: (1) the stage of the cartilaginous Anlage, from the end of the second to the end of the third month, during which the canal is still a simple foramen composed of cartilage; (2) the stage of ossification, from the end of the third to the beginning of the fifth month, during which a shell of bone is formed from the cartilage lining the foramen; (3) the stage of new bone formation, from the fifth to the ninth month, during which bone is laid down around the optic nerve to form the definitive optic canal. The primitive cartilaginous foramen is the orbital opening of the future canal, which is developed posteriorly from this by bony structures forming part of the cranial cavity. Ossification proceeds from two nuclei, one in the lesser wing of the sphenoid, forming the lateral wall; the other from the body of the sphenoid forming the medial wall of the optic canal. The pneumatization of the sphenoid does not begin till the third year, reaching its completion in the twelfth year. By the end of the second month, the pial sheath has become separated from the optic peduncle. By the second half of the third month the dural sheath has begun to differentiate, and by the end of the third month the arachnoidal sheath appears. (Bibliography.)

S. R. Gifford.

Gaudissart, P. **Papillary stasis.** Ann. d'Ocul., 1927, v. 164, April, pp. 270-275.

This was a case of intracranial neoplasm in which the author injected hypertonic serum intravenously. Almost immediately the retinal arterial tension returned to its normal level, and a few hours later the amount of papillary stasis had diminished by half. The results of the therapy had not disappeared at the end of ten days. Aside from the interest of the treatment, the result is considered of value in demonstrating how rapidly, in favorable circumstances, the ophthalmologic picture reveals variations in intracranial pressure.

L. T. P.

Herzfeld, E., and Rohrschneider, W. **Bilateral choked disc in Werlhoff's disease.** (1 ill.) Med. Klin., 1927, v. 23, May, p. 790.

With a case report of bilateral choked disc in Werlhoff's disease or purpura hemorrhagica the development of the condition is discussed. The retinal hemorrhages were no doubt a part of the general disorder. The swelling of the nerve heads varied considerably from time to time, according to the severity of the other symptoms. The writers feel that some of the nerve swelling, and maybe all, was due to increased intracranial pressure secondary to cerebral hemorrhages, which would also, to some extent, account for the severe headaches.

Beulah Cushman.

Holth, S. **Central amblyopia in a diabetic tobacco addict, cured by insulin in spite of continued excessive use of tobacco.** Acta Ophth., 1927, v. 5, nos. 1-3, pp. 195-198.

The patient described by Holth was fifty-eight years old and an inveterate smoker. His vision decreased steadily and a central scotoma for white and colors appeared. The urine showed considerable sugar. Abstinence from tobacco was recommended but the patient continued to indulge. After insulin was used to relieve his diabetic condition vision greatly improved and the scotomata cleared, in spite of constant use of tobacco. *E. M. Blake.*

Lederer, R. **An attempt to influence the course of tabetic optic atrophy.** Zeit. f. Augenh., 1928, v. 64, Jan., p. 50.

Though the author points out the spontaneous variability of the course of tabetic atrophy, he reports with some enthusiasm his records of five cases treated with salvarsan, sodium nucleinate, and phlogetan (a derivative of nuclein). Three of his cases were unilateral, or at least the better eye was only slightly affected—a rather unusual finding in so small a series. Reviewing the literature on therapeutic results in tabetic atrophy, he feels that an attitude of passive fatalism can rationally be discarded. For his therapy he can at least claim complete harmlessness. *F. H. Haessler.*

Mylius, Karl. **Retrobulbar neuritis and its treatment with cocaine and adrenalin tampons in the nose.** Zeit. f. Augenh., 1928, v. 64, Jan., p. 22.

Records of thirteen cases of retrobulbar neuritis are detailed. In all of them striking improvement followed daily intranasal treatments with cocaine on an applicator followed by a tampon soaked in 1 to 1000 solution of epinephrin. The author never noted harmful affects of the therapy. Though he believes that the great improvement was directly due to the treatment, he does not regard it as proof that the retrobulbar neuritis was rhinogenic. In some of the cases the neuritis was unquestionably the result of multiple sclerosis. The treatment was effective in several cases in which recovery had come to a standstill spontaneously or following other therapy.

Since the work of Herzog, Mylius feels that the rhinogenic origin of retrobulbar neuritis is overemphasized. Herzog demonstrated the ease with which inflammatory processes can pass from the sinuses to the dural sheath of the optic nerve, and showed histologically that in many cases sinus processes exist despite negative rhinologic, roentgenologic, and gross anatomic findings. There is inflammation in the medullary cavity of the bone contiguous to the sinus, and there are demonstrable direct connections between the submucosa of the sinus on the one hand and the dura on the other. Mylius, however, emphasizes the fact that exhaustive studies (vision, field, dark adaptation, and ophthalmoscope) of the eye in a large series of cases of undoubted sinus disease revealed no evidence of optic nerve affection.

F. H. Haessler.

Pavia, J. Lijo. **Epipapillary membranes.** Rev. Oto-Neuro-Oft. y de Cir. Neurol. 1927, v. 1, Dec., p. 354.

This article gives the various types

of epipapillary membrane which have been described with several photographs of the fundi showing those personally observed by the author.

The shape is variable, including sickles, bands, triangles, arches, crescents, and spindles, usually with irregular outlines.

Seven cases are described somewhat in detail. The author suggests that these membranes may also arise in an acquired form from mechanical causes, especially through increased intracranial pressure. A bibliography is attached.

A. G. Wilde.

Sgalitzer, Max. **The mode of action of x-ray in brain tumor.** Zeit. f. Augenh., 1928, v. 64, Jan., p. 33.

Occasionally x-ray therapy produces striking improvement in symptoms of brain tumor. Choked disc may disappear, vision be improved and internal hydrocephalus be abolished. The author attributes this to histologically demonstrable changes which the x-rays produce in the epithelium of the choroidal plexus, resulting in diminished secretion of cerebrospinal fluid.

F. H. Haessler.

Velhagen, Karl. **Experimental observations on papillitis in purulent inflammations of the anterior part of the eyeball.** Graefe's Arch., 1927, v. 119, p. 255.

Associated with mild infections, in rabbits, of the anterior part of the vitreous and ciliary body with staphylococcus aureus, a papillitis can be produced with the greatest regularity. This papillitis is ophthalmoscopically visible, begins after about two days, reaches its height after a week, and diminishes in the third week, to be followed by neuritic atrophy. It is of a toxic character, and is fundamentally different from the neuritis produced by herpes virus in that it extends but little into the optic nerve and has not the faculty of spreading to the brain or to the other eye.

H. D. Lamb.

Velhagen, K. **Experiments with herpes virus in the transference of infection from eye to eye.** Graefe's Arch., 1927, v. 119, p. 325. (See Section 7, Uveal tract, sympathetic, disease, and aqueous humor.)

12. VISUAL TRACTS AND CENTERS

Christiansen, Viggo. **A special form of nasal hemianopsia.** Acta Ophth., 1927, v. 5, no. 1, pp. 78-87.

Christiansen states that the most important symptoms of a chiasmatic tumor are focal and due to pressure upon the optic pathways. These are (1) early loss of visual acuity, (2) the lack of choked disc or other sign of increased intracranial pressure, (3) absence of changes in the fundi, except a simple atrophy of the nerve, (4) a fairly regular and progressive bitemporal hemianopsia, (5) marked disturbance in the region of the sella turcica, and (6) a more or less accentuated pleocytosis of the cerebrospinal fluid. If the tumor is outside the region of the chiasm, occasionally a nasal hemianopsia is encountered in the eye on the same side as the tumor, the other eye being normal. This is due to pressure on noncrossing fibers or to the fact that the optic fibers are more laterally placed and those nearer the tumor are pressed upon. Nasal hemianopsia is always difficult to interpret, especially if combined with alteration in the bones of the base of the skull.

E. M. Blake.

Kleist, K. **The uniocular visual field and its representation in the two layers of the inner granular layer of the cortex.** Klin. Woch., 1926, v. 5, pp. 3-10.

This article is concerned with the representation of the various portions of the retina in the visual cortex. It is largely a review of previous work by other investigators. Since the lateral geniculate body contains a separate representation for the crossed and uncrossed retinal fibers, the author believes, in conjunction with others, that the visual cortex also contains two such separate representations for these

fibers. The evidence for and against such a hypothesis is discussed.

F. H. Adler.

McCurry, Arthur L. **An examination of the fields of vision in the last weeks of pregnancy.** Brit. Jour. Ophth., 1928, v. 12, April, p. 177.

The author points out that recent investigation of the optic chiasm shows, contrary to the earlier views of its being on the optic groove, that it lies much further back. The larger anterior pituitary is granular and very vascular, the posterior lobe is made up of neuroglial nerve cells. It is generally recognized that the pituitary enlarges during pregnancy, but it is wholly the glandular portion. The amount of bitemporal contraction depends on the amount of hypertrophy of the pituitary gland, degree of compression of the chiasm, and anatomical peculiarities of the chiasm, sella turcica, and diaphragma sellæ. This investigator studied the fields of seventy pregnant women ranging in age from seventeen to forty-three years. Forty-three were primiparæ, fifteen were in the second pregnancy, five the third, four the fourth, two the fifth and one the seventh. The fundi were all normal. Only three complained of difficult vision: one had a muscle imbalance and two had high hypermetropic astigmatism. None complained of "seeing through a blue mist." The patients were divided into three groups: (A) Of twenty patients tested with a ten mm. object only two showed slight contraction. One had muscle imbalance, the second was extremely nervous. (B) Of thirty tested with a five mm. object, none showed contraction or scotomata. (C) Of twenty tested with a two mm. object thirteen gave absolutely normal fields. Of the remaining seven, four had only one field contracted. Of these last, one had tuberculosis, one high hyperopia, and the third albuminuria. The amount of the contraction was within physiological limits.

From this investigation, together with that of Beckerhaus, who examined 150 cases, the author concludes that bitemporal contraction of the fields of vision due to pregnancy does not occur. Owing to the discrepancy between European and American findings, it might be well to inquire into racial peculiarity of skull or pituitary formation, the possibility of retinal fatigue, or the influence suggestion may have. *D. F. Harbridge.*

13. EYEBALL AND ORBIT

Avizonis, P. **On cryptophthalmus.** Zeit. f. Augenh., 1928, v. 64, March, p. 240.

In this case of cryptophthalmous, apparently movable eyes were covered by skin in which there was no lid slit, lids, or brows. At operation it was found that the conjunctival sac seemed to exist, but except over the cornea was obliterated by countless strands of fibrous tissue. The cornea was not developed and was distinguished only as a bluish area in the sclera. The author tabulates the characteristics of the fifty cases reported in the literature since the first one was described fifty-five years ago. Among nineteen cases which were operated on there was not one which was functionally or cosmetically successful. *F. H. Haessler.*

Brøns, I. **Case of pulsating exophthalmus due to aneurism.** Oft. Selskab Forhandlinger (Copenhagen), 1928, pp. 21-25.

A young male had exophthalmus on the right side, following an injury a year previously. The exophthalmus was accompanied by slight ptosis, with some congestion of the retinal vessels and some edema of the papilla. Pressure on the eyeball caused the exophthalmus to disappear, and it did not reappear as long as pressure was maintained in the neck over the right carotid artery. A stethoscope placed on the right temple or on the eyeball revealed a blowing murmur synchronous with the pulse. Treatment by digital compression of the carotid artery up to three hours daily failed

to give any results. The right common carotid artery was then ligated under general anesthesia. No complications occurred: the pulsating exophthalmus disappeared promptly but the edema of the disc remained for many months before it finally faded out. In any case of exophthalmus following injury, keep in mind the possibility of pulsation and use the stethoscope. *D. L. Tilderquist.*

Elschnig, H. H. **Syphilitic tophus of the lacrimal bone.** (1 ill.) Klin. M. f. Augenh., 1928, v. 80, Feb., p. 218.

Two months after a fall on the nose, a woman aged twenty-six years noticed a painful redness and swelling near the nasal angle of the lids, caused by a thickening of the bone. A Wassermann test proved positive. After local treatment with gray plaster and fourteen intramuscular injections of spirobismal the affection disappeared completely. *C. Zimmermann.*

Hertz, V. **Case of unilateral exophthalmus.** Oft. Selskab Forhandlinger (Copenhagen), 1928, pp. 19-21.

The patient, a male aged seventy-eight years, came first in April, 1921, presenting a left-sided exophthalmus of two months' duration. There was a high degree of hyperopia, much reduced vision, and sclerotic changes in the retinal vessels, in both eyes, but there were no findings to explain the exophthalmus. It was noted that the patient had a moderate enlargement of the lymph nodes in the neck, in the axillas, and in the groins. The left orbit was exposed three or four times to the roentgen ray and the exophthalmus disappeared almost entirely in less than two weeks. Eighteen months later he returned, the exophthalmus had not recurred, but the lymph nodes mentioned had enlarged very much. Roentgen ray treatments to the lymph nodes were given and there followed a marked reduction in the size. The patient died shortly afterward of a lobar pneumonia. At autopsy, the enlarged lymph nodes proved to be carcinomatous; there were large metastases in the pancreas. The author's theory is that the exophthalmus was due to metastases in the orbit, which the roentgen ray had caused to subside. *D. L. Tilderquist.*

Møller, H. U. **Unilateral exophthalmus following use of thyroid extract.** Oft. Selskab Forhandlinger (Copenhagen), 1928, pp. 4-6.

The patient, a female aged forty-nine years, came in July, 1927, complaining of dyspnea, loss of weight, palpitation, pruritus, polyuria, lacrimation, and protrusion of the eyes, especially the left. The history revealed that seven years earlier thyroid extract had been prescribed for her on account of falling of the hair. She had kept on periodically taking the thyroid tablets (P. D. and Co.) up to five per day. Examination showed some edema of the eyelids, some protrusion of the right eye, but much more marked of the left (a difference of four mm.). Definite Dalrymple, Graefe, and Moebius signs were present. The thyroid was slightly enlarged; the urine contained sugar and albumin. The use of the thyroid extract was discontinued and the patient was placed on antidiabetic diet; no other treatment was used. Examination two months later revealed that the general symptoms had all disappeared. The left eye protruded about two mm. and the lid symptoms were still present to some extent. The enlargement of the thyroid had disappeared. It seems clear to the author that the use of the thyroid extract had brought on the exophthalmus and the other symptoms in this case. *D. L. Tilderquist.*

Monastyrskaia-Levshitskaia, L. S. **Dividing the optic nerve from above in enucleation.** Russkii Opht. Jour., 1928, v. 7, April, pp. 468-471.

In malignancy, when the removal of a large piece of the optic nerve in connection with the eyeball is desirable, a modification in the technique of enucleation is proposed; while the eyeball is rotated well downward by a forceps applied to the stump of the superior

rectus, the scissors are inserted from above between the conjunctiva and the eyeball, and the optic nerve is easily reached and severed at a distance of fifteen to eighteen mm. from the eye.

M. Beigelman.

Stark, W. G. **Three cases of orbital abscess secondary to suppurative sinusitis.** Canadian Med. Assoc. Jour., 1928, April, p. 423.

In each case the frontoethmoidal cells extended posteriorly close to the apex of the orbit, preventing satisfactory drainage through the nasofrontal duct. This anatomical arrangement was in itself sufficient to account for failure of operations performed elsewhere in the first two cases. In all the cases an intraorbital abscess was present but there was no evidence of an extension of the infection through the periorbita, or of an orbital cellulitis.

So far as the location, extent, and nature of the orbital abscess are concerned, there was little difference between the two cases without visual disturbance and the one with complete blindness.

In case three, the nasofrontal duct was closed and, although there was partial drainage of the frontal sinus through the ethmoidal cells, this drainage did not prevent an increase in intraorbital pressure sufficient to cause optic atrophy and blindness.

W. H. C.

14. EYELIDS AND LACRIMAL APPARATUS

Aubineau, E. **Congenital entropion.** Ann. d'Ocul., 1928, v. 165, March, pp. 161-169.

Total congenital entropion is commented on and the published cases are mentioned. The author here describes and illustrates two cases, each representing a distinct type. The first was of the spastic type without any deficiency in the tarsus. The condition involved the lower lids of each eye. The second was unilateral and was associated with a deficiency or absence of the tarsus of the lower lid.

L. T. P.

Elschnig, H. H. **Herpes tonsurans of the eyelids.** (1 ill.) Klin. M. f. Augenh., 1928, v. 80, Feb., p. 246.

A boy aged four years showed a plaque with vesicles partly subepithelial, partly intraepithelial, and scales of the skin of the left lower lid, with absence of lashes. Microscopically trichophyton tonsurans was found. Cheek and nose showed similar affections. Treatment with tar ointment, ten per cent tincture of iodin, and Arning's tincture ("Antrarubinlack") cured the affection in two weeks.

C. Zimmermann.

Fowler, W. **Dacryocystitis.** Jour. Mich. State Med. Soc., 1927, v. 26, p. 716.

Dilatation of the lacrimal duct and curetting of granulation tissue are rational measures; but after slitting the canaliculi do not return to a normal condition. Fowler found that an incision could be made in the dome of the sac, through which large probes might be passed to dilate the duct. After passing a no. 4 Bowman probe through the lower canaliculus into the sac, a double-edged curved knife is passed into the dome of the sac from a point eight mm. above the tendo oculi, until its point touches the probe held horizontally in the canaliculus. Through the knife wound a probe is inserted, beginning with a smaller Theobald probe, and increasing to no. 16 if this is not too large for the bony canal. The sac is gently curetted and iodine applied to the field of operation. Hemorrhage may be considerable, but is usually negligible. This operation replaces Ziegler's rapid dilatation and Thompson's curetting. No visible scar is left after two or three weeks from the operation. No surgery of the lacrimal apparatus should be advised until palliative measures for a reasonable length of time have failed to give results.

E. J.

Gasteiger, Hugo. **Involvement of the anterior segment of the eyeball in erysipelas.** Archiv Oftalmologii (Russion), 1928, v. 4, part 1, p. 56. (See Section 5, Conjunctiva.)

Ibrahim, S. A. **Treatment of lacrimal fistula.** Bull. Ophth. Soc. Egypt, 1927, p. 137.

An incision is made around the fistula, two mm. from its margin. The tissue thus isolated is seized with forceps and removed. Afterward the wound is dried with gauze and a piece of B.I.P. paste is rubbed into every part of the cavity. This paste is made from ten grams of bismuth subnitrate and twenty grams of iodoform mixed by powdering in a mortar and adding ten grams of liquid paraffin. After this dressing is applied it is repeated daily for ten or twelve days. The healing usually occupies from ten days to two weeks. *E. J.*

Kalt, M. E. **Diffuse adenitis of the meibomian glands.** Ann. d'Ocul., 1928, v. 165, Feb., pp. 97-105.

The author describes a case of persistent swelling of the four lids which was still unchanged, in spite of all treatment, after fifteen months. A section from the tarsus of one lid showed an infiltration of the glands with solid tissue, destroying their possibility of function. To this was attributed failure of treatment. *L. T. P.*

Kreiker, A. **Wedge-shaped implantation of oral mucous membrane into the intermarginal seam for trichiasis.** (3 ill.) Klin. M. f. Augenh., 1928, v. 80, March, p. 386.

Kreiker makes the intermarginal incision exactly at the anterior edge of the free tarsal border, thus mobilizing the skin of the lid drawn into the cicatrix. From the inner aspect of the lower lip a strip of mucous membrane is dissected (1.5 to 2 millimeters wide), and it is wedged into the lid wound. It is important that some submucous tissue (fat and salivary glands) shall remain on the flap. The lid incision must be from two to three millimeters deep. Sutures are not necessary.

C. Zimmermann.

Larsen, V. and Jörgensen, V. **X-ray examination of the lacrimal passages.** Acta Ophth., 1927, v. 5, nos. 1-3, pp. 213-226.

Larsen and Jörgensen point out the value of x-ray studies of the normal and pathological lacrimal passages, especially helpful in determining the type of treatment and results of operative procedures. For injecting the passages they employed a Danish preparation called "jodumbrin," which is almost identical with "lipiodol," except that it is less viscous and does not require warming before injection. The x-ray technique is described and several well reproduced x-ray plates illustrate the article. *E. M. Blake.*

Lipowitz, N. S. **(1) Congenital entropion of the lower lid, (2) Spastic ectropion of the upper lid.** Klin. M. f. Augenh., 1928, v. 80, March, p. 353.

A child aged one year presented a congenital entropion of the lower lid of the right eye, which was corrected by a Hotz operation. In the second patient, a boy aged three years, the main cause of the spastic entropion of the right upper lid seemed to be a keratitis. After this was cured the ectropion subsided.

C. Zimmermann.

Monukova, N. K. **A case of isolated purulent inflammation of the lacrimal canaliculus.** (Dacryocanaliculitis.) Archiv Oftalmologii (Russian), 1928, v. 4, pt. 11, p. 275.

A persistent swelling of the upper lid at the internal angle proved to be the result of a purulent dacryocanaliculitis. Incision of the upper canaliculus evacuated a considerable amount of pus, from which the pneumococcus was isolated. The lacrimal sac and duct were normal. *M. Beigelman.*

Ploman, K. G. **Internal fistula of the lacrimal sac.** Acta Ophth., 1927, v. 5, nos. 1-3, pp. 277-284.

The patient had previously had an operation on the left lacrimal sac. Following a recurrence of suppuration, x-ray revealed a sac composed of two dilated portions, one above the other. Extirpation of the sac was performed and a fistula into the nasal cavity

found. Histological examination of the sac showed scattered subepithelial tubercles and a marked epithelial proliferative reaction. One year later a right-sided dacryocystitis developed and the sac was removed. The excised mucous membrane of the nose disclosed giant cell tubercles. Apparently a tuberculous dacryocystitis had developed secondarily to the tuberculous changes in the mucous membrane of the nose and with necrosis of the bone.

E. M. Blake.

Salvati. **Ptosis produced by injection of alcohol.** Ann. d'Ocul., 1928, v. 165, Mar., pp. 203-204.

The injection of one c.c. of ninety per cent alcohol and several drops of novocain into the superior palpebral levator near its insertion into the tarsus, in order to produce a temporary ptosis, is recommended. It is desirable at times in such conditions as keratitis from lagophthalmos or neuroparalytic keratitis, in certain exophthalmias, and even in severe injuries. The injection is followed by a slight edema on the next day. The ptosis lasts about one month. If desired the period may be prolonged by a second injection.

L. T. P.

Santa Cruz, J. B. **Dacryocystorhinostomy.** Arch. de Oft. Hisp.-Amer., 1927, v. 27, Feb., p. 110.

The method described for the creation of an opening between the lacrimal sac and the nasal cavity is practically the Mosher modification of the Toti technique. The author reports about two hundred cases, and believes this method of attack is preferable to extirpation of the sac when the interference with drainage is below the sac. This is best determined by x-ray after injection of an opaque substance within the lacrimal system. The crucial part of the operative technique is making the opening through the bone of sufficient size, and accurate approximation of the cut edges of the sac to the nasal mucous membrane with fine sutures.

This artificial opening into the nose is not advisable in tuberculous infections of the sac, or where it is involved in any acute process or malignancy. The author believes that when epiphora is coincident with trachoma this method of drainage is especially valuable. He also believes that this removes the source of local infection in serpiginous ulceration of the cornea as effectively as extirpation.

A. G. Wilde.

Schmidt, P. **A probe for dilatation of strictures of the nasolacrimal duct.** (2 ill.) Klin. M. f. Augenh., 1928, v. 80. Mar., p. 390.

Schmidt's aim was to construct a probe which could be made thicker during withdrawal than on introduction. His instrument consists of a cannula with a lateral opening near the point. After the stricture has been passed by the cannula, a probe is pushed through the opening of the latter. The double tip including cannula and probe thus has a larger diameter and stretches the stricture when the instrument is extracted.

C. Zimmermann.

Stein, R. **Multiple minute abscesses of the palpebral conjunctiva.** (1 ill.) Klin. M. f. Augenh., 1928, v. 80, March, p. 329.

A woman aged twenty-six years complained for two weeks of disagreeable pressure and feeling of foreign body in both eyes. The conjunctiva of upper and lower lids presented four lenticular abscesses from one to 2.5 millimeters in diameter, without signs of inflammation or tendency to spontaneous perforation. Incision evacuated thick pus, which consisted of fine detritus, leukocytes, and an enormous quantity of staphylococci.

A second case represented perhaps an acute variety of the first on account of the accompanying inflammation and the breaking down of the abscesses into ulcers. *C. Zimmermann.*

Wollenberg, Albrecht. **Abnormal permeability of the lacrimal passages for air.** Klin. M. f. Augenh., 1928, v. 80, Feb., p. 220.

Both lower canalliculi of a woman aged forty-six years were slit fifteen years ago, and radical operations on both frontal and supramaxillary sinuses had been performed with removal of the right lower turbinate. In blowing her nose she compresses the right canaliculi with her finger to prevent the air escaping upwards through the tear passages. In consequence of the absence of the lower turbinate, chronic rhinitis, and frequent forced blowing, the lower opening of the nasolacrimal canal most likely became abnormally wide. *C. Zimmermann.*

15. TUMORS

Ginzburg, J. J. **Rare tumors of the optic nerve.** Klin. M. f. Augenh., 1928, v. 80, March, p. 357. (4 ill.)

A boy aged six years had a serous cyst of the sheath of the right optic nerve, causing exophthalmus straight forward without palsies of the ocular muscles and without pressure on the optic nerve. Extirpation of the anterior wall cured the condition, with vision of 0.7.

A man aged forty-two years complained of pain in his right eye, which had been blind two years. The site of the disc was occupied by a round yellowish protuberance surrounded by a halo of dark pigment. Some retinal vessels emerged from under it. The eye was enucleated and showed an oviform tumor, six millimeters broad, and four millimeters high, spreading in tongue-shaped processes into the retina and choroid, which contained more pigmented cells. It was a polymorphous round and spindle-celled sarcoma, which had grown through the lamina cribrosa for a short distance into the glaucomatous excavation of the optic nerve. *C. Zimmermann.*

Gyotoku, K. **Metastases of rabbit-eye sarcoma from the anterior chamber.** Zeit. f. Augenh., 1928, v. 64, March, p. 274.

After planting rabbit-eye sarcoma in the anterior chamber, metastases to the internal organs were observed in every case. Sarcoma transplanted (1) into the anterior chamber and (2) beneath the bulbar conjunctiva metastasises first into the lung; and next, to the liver in the first instance and to the kidney in the second. The time between inoculation and the appearance of metastases is the same for intraocular and subconjunctival inoculations. When the iris is involved metastases may develop before the external tissues are perforated. Where there was much hemorrhage during enucleation metastases occurred early. *F. H. Haessler.*

Gyotoku, K. **On transplantation of rabbit sarcoma into the rabbit's eye.** Zeit. f. Augenh., 1928, v. 64, March, p. 259.

The eye is histologically and biologically a specific organ in which it is interesting to observe tumor growth. The author transplanted sarcoma emulsion under the conjunctiva into the anterior chamber, the vitreous, and the orbit, and got growth in seventy-eight to ninety-four per cent of the cases, depending upon the localization of the transplant. The tumor could not be transplanted into the cornea. Immediately after transplanting, the sarcoma particles disappeared, but after seven to nine days growth would be noted. The sclera was very resistant to the tumor growth, which for the most part was expansive, though infiltration and perforation were noted. The rabbits usually died from cachexia, and metastases were found in the internal organs. A tumor which had been transplanted successfully to one eye was again transferred to another eye, but the reaction of tumor and eye were no different from the cases in which an eye had been directly inoculated with visceral sarcoma. *F. H. Haessler.*

Löwenstein, A. **Radium radiation in orbital sarcoma.** (2 ill.) Klin. M. f. Augenh., 1928, v. 80, Feb., p. 237.

An infiltrating, rapidly growing, locally relapsing sarcoma of the orbit with intense papillitis and retinal hemorrhages disappeared under large doses of radium in a very short time and showed no relapse after two years. A long time after the radiation, disturbances in nutrition and sensitiveness of the cornea and the well known opacities of the lens set in. After subsidence of the exophthalmus marked enophthalmus occurred. With recession of the exophthalmus —0.75 D. of myopia turned into +1.75 D. In this, and another case with absolutely negative result and exitus from metastases after exenteration of the orbit, the retina tolerated, without appreciable functional disturbances, very large filtered radium doses, up to five thousand millicuries in six hundred radium hours within two years.

C. Zimmermann.

Lundsgaard, K. K. K. **Case of tumor of orbit, removed by Krönlein's operation.** Oft. Selskaps Forhandlinger (Copenhagen), 1927, pp. 31-32.

The patient was a male, thirty-seven years old. Ten years before he had began to show a left-sided exophthalmus, which had increased slowly without pain. Examination showed an exophthalmus of twelve millimeters and a downward displacement of the eye of eight millimeters. The vision of the affected eye was reduced to counting of fingers. Krönlein's operation seemed the only practicable method of removal. The bone of the lateral plate of the orbit was removed with chisel and hammer. The tumor, which was about the size of a fig and extended to the optic canal, was easily accessible and was removed in its entirety. It was cystic and contained masses resembling boiled rice. Microscopically it proved to be a myxoendothelioma. Two weeks after operation the exophthalmus was nearly gone and the vision had risen to 6/12.

D. L. Tilderquist.

Meller, Josef. **An unusual inflammatory tumor and its treatment.** Wien. Klin. Woch., 1926, v. 39, Sept., p. 1080.

Three case reports of intraorbital tumor are given, in which the differential diagnosis was difficult to make. Because of the question in the diagnosis and the eye being slightly affected, treatment with roentgen rays was used. The results were very satisfactory, and the roentgen treatment with dosage is given in detail.

Beulah Cushman.

Satanowsky, Adrogue, and Sena. **Tumors of the caruncle.** Semana Med., 1928, v. 35, April 12, p. 881.

The authors recently had three cases of tumor of the caruncle under observation and study. Approximately seventy have been described in the literature. The table of Beauvieux giving their origin and classification is reproduced from the Archives d'Ophthalmologie, 1913.

The three cases reported were a papilloma, an adenoma, and an epithelioma. Histological studies were made of the sections, and the fact is emphasized that many of these are clinically indistinguishable and require stained sections to arrive at an accurate diagnosis. A bibliography is attached, with five plates showing the histological structure of the cases presented.

A. G. Wilde.

Seefelder, Richard. **Carcinoma and sarcoma in the same eye.** Wien. klin. Woch., 1926, v. 39, p. 1092.

One case is reported of the finding of sarcoma of the choroid and carcinoma of the limbus and cornea in the same eye. The choroidal sarcoma was only found in studying serial sections of the enucleated eye. *Beulah Cushman.*

Zelenkovsky, I. V. **Late metastases in sarcoma of the uvea.** Russki Ophth. Jour., 1928, v. 7, April, pp. 447-453.

In three cases generalized metastasis of choroidal sarcoma manifested itself very late: over ten years, ten years, and four years respectively after enucleation of the eyeball.

M. Beigelman.

16. INJURIES

Cross, G. H. **Removal of shot from eyeball by special forceps and using fluoroscope.** Trans. Amer. Ophth. Soc., 1927, v. 25, p. 80.

A man who had lost one eye came with a no. 6 lead shot lodged in his remaining eye twelve or fifteen mm. back of the cornea. Wire ring forceps, made to fit the shot, were introduced through an incision below the external rectus muscle according to the directions of the roentgenologist, who used a double plane fluoroscope. At the second attempt the shot was seized and withdrawn. For such an operation the instruments had to be short, to permit the fluoroscope to be brought close to the patient's eye. The forceps had to be self-acting, so that when the foreign body was caught the operation was practically over. An ambidextrous operator has a decided advantage. There was no alternative but to operate left handed. The patient's left eye was involved and it was necessary to stand at the head of the table, since the fluoroscope operator required two sides of the patient's head and the x-ray tubes took up the other two sides, leaving but one place for the surgeon and no room for an assistant. A speculum, or any other object which is capable of casting a shadow or of interfering with the shadow of the foreign body or of the forceps, can not be used. *E. J.*

Elschnig, H. H. **Hyphema in vitreous hernias of the anterior chamber.** (1 ill.) Klin. M. f. Augenh., 1928, v. 80, Feb., p. 200.

In a pocket of a hernia of vitreous in the anterior chamber Elschnig saw blood which remained liquid for about three months. *C. Zimmermann.*

Hoffmann, W. **Corodenin, light, and eye.** Klin. M. f. Augenh., 1928, v. 80, March, p. 342.

Remarks to the article by Reichert in the last number p. 213. Hoffmann's experiments showed the same effect on the ultraviolet in eyes of rabbits and man. They speak against the contention of Reichert that corodenin may prevent photoelectric conjunctivitis.

C. Zimmermann.

Horay, G. **Four rare eye injuries.** (3 ill.) Klin. M. f. Augenh., 1928, v. 80, Feb., p. 202.

(1) Cilium in the iris with resulting pearl cyst. At injury of the right eye of a child aged six years by a nail, a lash had entered the iris. A yellowish cyst with homogeneous pulpy contents developed. It was extirpated. Its wall consisted of stratified pavement epithelium, and was produced not by the lash itself but by the simultaneous entrance of parts of epidermis and sebaceous glands.

The tolerance of the eye for foreign bodies was shown in a woman aged forty-one years who for thirty-three years had had a lash projecting into the anterior chamber whose ends had grown into the cornea and which had turned white.

(2) A horse hair in the lens for thirty-seven years. A man aged forty-eight years had sustained an injury of his right eye by a whip thirty-seven years previously. A hair projected from the optical axis of the lens into the anterior chamber and vitreous, and had produced cataract. Extracted with the cataract, it proved to be six millimeters long. Most likely it had entered the eye at the time of the injury.

(3) The right eye of a man aged forty years was injured by an anilin pencil, which left pieces in the conjunctiva. After necrosis set in the cornea, at first clear, became infiltrated and developed deep ulcers spreading toward the center. Repair began after five weeks, and left cicatricial adhesions of the conjunctiva and dense opacities of the cornea.

(4) Traumatic enophthalmus with indirect injury of the optic nerve. In an automobile collision a man aged twenty-eight years received a severe blow on the right upper and lower orbital margins, causing a fracture of the upper orbital wall, with enophthalmus. A defect of the visual field

and pallor of the optic disc indicated a lesion of the optic nerve, probably from an injury of the upper wall of the optic canal. The author attributes the enophthalmus in such cases to atrophy and shrinkage of the orbital tissue due to the injury to the nerve.

C. Zimmermann.

Liebermann, L. **Extraction of foreign bodies deeply lodged in the cornea.** (1. ill.) Klin. M. f. Augenh., 1928, v. 80, Feb., p. 209.

About three millimeters from the foreign body a small incision of the cornea with a lance-shaped knife was made, so small that aqueous did not escape. Then a diminutive ("Mikro") Deschamps needle, the blade of which is bent at 100°, was introduced, and with it the foreign body was pushed out from behind. Smooth recovery followed. *C. Zimmermann.*

Reichert. **Light, eye, and corodenin.** Klin. M. f. Augenh., 1928, v. 80, Feb., p. 213.

From his several years experience Reichert found corodenin an excellent prophylactic against ophthalmia caused by cinema lights. It also gave subjective relief in affections with intense photophobia. This is perhaps due to impregnation of the tissues with corodenin, the rapid removal of which is prevented by simultaneous instillation of adrenalin. *C. Zimmermann.*

Satanowsky, Paulina. **Are the effects of light from neon tubes harmful?** Semana Med., April 5, 1928, p. 821.

Owing to the increasing use of illuminating tubes filled with neon, or a mixture of neon and mercury, for advertising purposes, the question of their possibly harmful effects upon the eyes has been raised.

The methods of obtaining neon from the air are described as well as its chemical and physical properties. When through a tube filled with this gas there is passed an electric current, a brilliant pinkish light is generated. The addition of mercury will produce a bluish color.

After considerable inquiry the author has been unable to find a single authentic case in which harmful effects have been produced among those most exposed to these emanations. Most of the ultraviolet radiations generated are absorbed by the tubing or the atmosphere.

The pinkish rays of pure neon are perhaps more irritating, hence when these lights are to be mounted near the observer's eye the bluish neon-mercury light is preferable.

In an individual whose duties demand his remaining constantly in proximity to these lights, when symptoms of irritation develop, they should be regarded as arising from personal idiosyncrasy. Simple protective glasses should be sufficient. *A. G. Wilde*

17. SYSTEMIC DISEASES, INCLUDING PARASITES

Bjerrum, O. **Remarks on the relationship between diseases of the teeth and eyes.** (A review.) Acta Ophth., 1927, v. 5, no. 1, pp. 39-48.

Bjerrum gives a good review of the literature pertaining to ocular disease of dental origin. He records personally observed cases of orbital phlegmon, fistulæ at the outer canthus, conjunctivitis, iritis, and asthenopia. Patients with dental pulpitis often have pain in the eye and considerable epiphora. He concludes that the dental origin of eye diseases is overestimated by American and English writers and not sufficiently recognized by ophthalmologists of the continent of Europe.

E. M. Blake.

Collier, J., Noble, W., and others. **Ocular complications of encephalitis lethargica.** The Lancet, 1928, Feb. 18, p. 339.

In a discussion before the combined sections of Neurology and Ophthalmology of the Royal Society of Medicine, Collier told of a case of vomiting and anorexia lasting three weeks without evidence of nerve involvement, until when the patient was dying, at

the end of the fourth week, the picture was a typical lethargic encephalitis. Brain tumor without papilledema might simulate encephalitis or poliomyelitis, only to be distinguished by differential count of the cerebrospinal fluid. Massive papilledema may occur in this disease, but in general it means that the symptoms are due to something else.

Noble, speaking from the ophthalmologist's point of view, thought optic disc changes a very rare complication, and this was concurred in by Feiling, Ady, and Holmes. Mayou, however, mentioned a case in which secondary optic atrophy had developed later. An early symptom of importance, referred to by some of the speakers, is paralysis or at least disturbance of convergence. Permanent paralysis of the oculomotor nerves is unusual, but may occur. The chairman, Bramwell, had found that in the chronic stage loss of power to move the eyes upward was important, sometimes attended with an oscillation or quivering of the eye that could not be called nystagmus. *E. J.*

Herrenschwand, F. **The participation of the eyeball in the dissemination of trichinæ in human trichinosis.** Graefe's Arch., 1927, v. 119, p. 374.

A woman thirty-eight years old, after suffering with nausea, vomiting, diarrhea, fatigue, and intense pain in the muscles, showed in a short time swellings in the eyelids. A test excision from the right deltoid muscle showed trichinæ about three weeks old in every section. The patient died in the following month, showing at autopsy severe intestinal and muscle trichinosis, trichinæ in the pericardial and cerebrospinal fluids, serous meningitis, mitral thromboendocarditis, thrombosis in the heart wall of the left chamber, serous pericarditis, congestive fatty liver, and confluent pneumonic foci in the right and left inferior lobes.

The left eyeball with its muscles and orbital tissue was excised, prepared and examined microscopically. The number of encapsulated trichinæ in the ocular muscles was exceptionally great and proportionally exceeded that in the skeletal muscles. In the peripheral part of the retina were found ten nodular foci consisting mostly of proliferated endothelium in the capillary linings. Six of these nodules contained a young trichina each. *H. D. Lamb.*

Katznelson, A. K. **A case of extraction of subretinal cysticercus.** Archiv Oftalmologii (Russian), 1928, v. 4, pt. II, p. 278.

In a case of subretinal cysticercus, after exact localization by several methods (Greef's, Schmidt-Rimpler's, etc.), a scleral injection eight mm. long was performed in the corresponding area, which had been exposed by temporary resection of the internal rectus and outward rotation of the eyeball. The cysticercus appeared immediately in the wound, and there was no loss of vitreous. The resulting acuity of vision was 20/20.

M. Beigelman.

18. HYGIENE, SOCIOLOGY, EDUCATION AND HISTORY

Ebstein, Erich. **From the early years of Albrecht von Graefe.** Graefe's Arch., 1927, v. 119, p. 1.

The letters of Albrecht von Graefe to the friend of his youth, Adolf Waldau, extend from 1850 to the master's death July 20, 1870. Following his student days in Berlin, he studied in Prague under Jäger, Rokitansky, and Skoda, and then went to Paris, where he worked particularly with Sichel and Desmarres. One of the letters from Paris is given in toto. There are also included three likenesses of the master, one at twelve years of age and two others as a young man. Since one hundred years from the day of Graefe's birth had elapsed on May 22, 1928, it is particularly appropriate to mention memorials of this great pioneer at this time.

H. D. Lamb.

NEWS ITEMS

News items in this issue were received from Drs. S. J. Beach, Portland, Maine; H. Alexander Brown, San Francisco; C. A. Clapp, Baltimore; M. H. Clark, Kansas City; John Green, St. Louis; W. D. Jones, Dallas, Texas; W. Holbrook Lowell, Boston; M. Paul Motto, Cleveland; J. M. Patton, Omaha; D. K. Pischel, San Francisco; C. W. Rutherford and G. F. Russell, Indianapolis; G. Oram Ring, Philadelphia; Edward Stieren, Pittsburgh; T. A. Woodruff, New London, Connecticut; H. V. Würdemann, Seattle; F. L. Wicks, Valley City, North Dakota; and C. A. Young, Roanoke, Virginia. News items should reach **Dr. Melville Black,** Metropolitan building, Denver, by the twelfth of the month.

Deaths

Dr. Frank A. Morrison, professor of ophthalmology in Indiana University school of medicine, Indianapolis, died June 7th from cerebral hemorrhage.

Dr. Willard S. Bracken, of Chicago, aged sixty-one, died April 18th of bronchopneumonia.

Dr. Howard McDougall Cameron, Sacramento, California, aged fifty-five, died March 21st of angina pectoris.

Dr. Joseph Alfred Andrews, Santa Barbara, California, aged seventy-one, died May 6th of heart disease following influenza.

Dr. David Bridgwood, Brockton, Massachusetts, aged thirty-four years, was drowned May 13th while on a fishing expedition at Moosehead Lake, Maine.

Miscellaneous

A chiropractor by the name of Hicks, at Lancaster, California, was tried by the State Board and fined $100.00 for fitting glasses and prescribing medicine for patients.

Mr. and Mrs. T. R. Crane, Jr., Chicago, have given the Hartford Hospital, of Hartford, Connecticut, a building for an eye, ear, nose, and throat department, to cost about $100,000. It is to be known as the Florence Crane Building, in honor of their daughter.

A recent survey of the school children of Cleveland in the first, third and fifth grades showed that seventy-one per cent had physical defects. The number of children examined was 72,961, and of this number 3,117 had defective vision.

The "Ohio Industrial Eyesight Survey Service Bureau" is reported to be sponsored by certain optometrists of Toledo. Industrial concerns are approached with a suggestion that an eyesight survey be made by the Bureau's experts without charge. The examination brings out many defects and glasses are recommended. The Toledo Academy of Medicine brands this scheme as strictly commercial and against public interest.

A course of ten lectures was held during April in San Francisco by Dr. Edward Jackson, of Denver, on the subject of "psysiological optics and their application to the correction of refractive errors". Eighteen ophthalmologists in San Francisco, Oakland, and Alameda attended, including Drs. H. Barkan, O. Barkan, F. Baxter, F. Cordes, J. Crawford, H. L. Franklin, E. Glaser, W. D. Horner, G. N. Hosford, R. S. Irvine, V. Lucchetti, R. J. Nutting, D. K. Pischel, F. Rodin, J. R. Sharpsteen, H. G. Smith, H. R. Smithies, and A. P. Wold.

We are in receipt of "Hobbies", published by the Buffalo Society of Natural Sciences, which contains two articles by Dr. F. Park Lewis of Buffalo. The first, entitled "a bird's-eye view, or how birds see", affords an interesting insight into one of Dr. Lewis' hobbies and is well worth any ophthalmologist's attention. The second article is entitled "Fossil eggs in Bermuda". Dr. Casey A. Wood has secured one of these fossilized eggs for the British Museum, and one for the McGill University, Montreal. One of these specimens was also presented by Mr. Motyer to Dr. Lewis.

Societies

Dr. Walter R. Parker, Detroit, is the new president of the American Ophthalmological Society. The next annual meeting will be held at Hot Springs, Virginia, June, 1929.

At the last meeting of the ophthalmological section of the Baltimore City Medical Society, Dr. C. A. Clapp was elected chairman and Dr. Aaron Robinson secretary.

The North Dakota Academy of Ophthalmology and Otolaryngology met May 23 at Devil's Lake, Dr. Rolf Tainter, Fargo, presiding. Luncheon was served the Academy at the Williamette Inn. Dr. A. T. Bailey, Jamestown, was elected to the presidency for the ensuing year.

At the meeting of the Connecticut State Medical Society held at Bridgeport, Connecticut, May 23 and 24, Dr. E. Terry Smith of Hartford was elected president of the Society, and Dr. Thomas A. Woodruff of New London was elected chairman of the eye, ear, nose and throat section.

At the meeting of the eye and ear section of the Maine Medical Association, held at the Belgrade Hotel on June 20, the following program was given: paper with lantern slides on "angiosclerosis" by Dr. William Zentmayer; talks by Dr. W. J. Gilbert, of Calais, on "cycloplegic refraction"; by Dr. S. J. Beach, of Portland, on "astigmatism"; and by Dr. M. C. Moulton, of Bangor, on "muscles as a routine".

At the monthly meeting of the Kansas City Eye, Nose, and Throat Society, April 19th, a ruling was passed that in the future all those applying for membership must

have first passed the examinations of the National Boards of Ophthalmology and Otolaryngology. The election of officers resulted as follows: T. S. Blakesley, president; V. M. McCarty, vice-president; W. C. Patton, second vice-president; E. Pickens, treasurer; and H. E. Eubanks, secretary.

The ophthalmological section of the Cleveland Academy of Medicine was the guest of the new St. Luke's Hospital, Friday evening, May 25th. The meeting was a clinical one and was confined to the biomicroscopy and Gullstrand examinations and to demonstrations of the interesting and instructive cases by Drs. A. B. Bruner, Paul Moore, L. Kasco, J. E. Cogan, O. F. Simonds, and M. P. Motto.

At the recent meeting of the Pacific Coast Oto-ophthalmological Society in Santa Barbara, the following officers were elected: Dr. Robert Hampton, president, Salt Lake; Dr. Ralph Fenton, first vice-president, Portland; Dr. Eugene Lewis, second vice-president, Los Angeles; Dr. Walter F. Hoffman, secretary-treasurer, Seattle. In all probability, the meeting next year will be held in Salt Lake City.

Personals

Dr. Wilmer, of Baltimore, left July 1 for his vacation in Virginia.

Dr. Jonas Friedenwald, Baltimore, has recently spent a month in North Carolina.

Dr. E. L. Russell of Kansas City at last reports was still confined to hospital, but was improving.

Dr. and Mrs. H. B. Davis of Kansas City left recently for a two weeks' stay in New Mexico.

Dr. Virgil McCarty of Kansas City, has been in Asheville, North Carolina, for several weeks.

Dr. Morris Simpson of Kansas City addressed the Benton County Medical Society at Siloam Springs, Arkansas, on May 10.

Dr. J. W. Kimberlin of Kansas City left May 17 to attend the Kentucky Derby, and then to start on a trip to South America.

Drs. W. D. Jones and J. Guy Jones have opened their offices at the Jones Eye, Ear, Nose, and Throat Hospital and Clinic, Dallas, Texas.

Dr. and Mrs. H. Maxwell Langdon of Philadelphia sailed July 4 to spend the summer in European travel.

Dr. and Mrs. J. M. Patton of Omaha planned to leave the latter part of June to attend the Oxford Congress in England and to be away for two or three months.

Dr. and Mrs. G. Oram Ring of Philadelphia sailed early in July to spend the summer mainly in Spain and the Pyrenees.

Dr. James F. Van Fleet of New York City has been appointed surgeon in the eye department of the Manhattan Eye, Ear, and Throat Hospital.

Dr. Edward Stieren of Pittsburgh, Pennsylvania, was an invited guest of the West Virginia State Medical Society at the recent meeting in Fairmount, West Virginia. The subject of his address was "the management of intraocular foreign bodies".

Dr. John Green of Saint Louis was the guest of the Kansas Medical Society at its annual meeting in Wichita, May 8 to 11. The title of his address was "How the physician can help to conserve eyesight and prevent blindness".

At a recent reorganization of the Board of Trustees of the University of Pennsylvania, Dr. George E. de Schweinitz was appointed chairman of the committee in charge of the management of the medical school of the University.

Dr. C. S. O'Brien, head of the Department of Ophthalmology, University of Iowa, has been granted a two years' leave of absence for research study in the various clinics of Europe. Dr. C. W. Rutherford, now of Indianapolis, will have charge of the department of ophthalmology, in Iowa City, as associate professor of ophthalmology during Dr. O'Brien's absence.

Notice has been received of the removal of the offices of Dr. C. A. Young, of Roanoke, Virginia, to the Shenandoah Life Building. Dr. Young is no longer connected with the Gill Memorial Eye, Ear, and Throat Hospital of Roanoke.

Dr. Harvey J. Howard has been appointed full time professor of ophthalmology in the Washington University Medical School, Saint Louis.

Dr. A. B. Bruner of the ophthalmic division of the Lakeside Hospital, Cleveland, has been east for a six weeks' holiday.

Colonel Harry V. Würdemann of Seattle, Washington, has been graduated with honor as a flight surgeon, at Brooks Field, Texas.

Dr. H. O. Gardner of Mount Pleasant, Iowa, was recently appointed to the ophthalmic division of the Lakeside Hospital, Cleveland.

Dr. John T. Fawcett, formerly resident ophthalmologist to the Lakeside Hospital, Cleveland, was recently married to Miss Doris Lillian Jackson of that city.

At the recent annual meeting of the Ohio State Medical Association, held at Cincinnati, Dr. M. Paul Motto addressed the ophthalmological section on "concomitant convergent strabismus".

The University of California Medical School announces the following promotions: Dr. Frederick C. Cordes, assistant clinical professor of ophthalmology; Dr. George N. Hosford, instructor in ophthalmology; Dr. Dohrmann Pischel, instructor in ophthalmology.

Dr. Hans Barkan has been appointed clinical professor of ophthalmology in the Stanford University Medical School, and Dr. W. S. Sweet his assistant. Dr. Hans Barkan succeeds Dr. A. B. McKee, who in turn succeeded Dr. Barkan's father. Dr. A. B. McKee is retiring from active work after a long and faithful service.

Dr. Wm. C. Finnoff of Denver recently read a paper before the Illinois State Medical Society on "the difficulties in diagnosis of tuberculosis of the eye". From there he went to Rochester and spent a few days with the Mayos, and he then read a paper before the Nebraska Academy of Ophthalmology and Otolaryngology at Hastings, Nebraska, on "the histopathology of surgical complications".

Dr. George E. de Schweinitz of Philadelphia delivered the address at the May festival of the Pennsylvania Institution for the Blind, which is located at Sixty-fourth Street and Malvern Avenue, Philadelphia. The institution is confronted with a deficit of $26,000, and Dr. de Schweinitz' special plea was for the removal of this handicap. Five graduates who have attained distinction in their work also spoke at the ceremonies.

Dr. William Zentmayer of Philadelphia delivered an address on May 14th before the section on the eye, ear, nose, and throat of the Academy of Medicine of Northern New Jersey, on "the treatment of hyperphoria and hypertropia". Dr. Zentmayer also addressed the section on the eye, ear, nose and throat of the Maine State Medical Society, June 20th, on "some vascular conditions of the retina, with special reference to angiosclerosis".

Dr. David H. Coover of Denver recently buried his only son, David Gross Coover, aged thirty-five years, who had been a sufferer from tuberculosis for a number of years, and for the last fifteen years had been a resident of California, where he died.

INTERNATIONAL CONGRESS OF OPHTHALMOLOGY

September 5 to 13, 1929

The following advance information concerning some details of the program of the international congress to be held next year has been received from Dr. H. M. Roelofsz through Dr. George E. de Schweinitz. The manuscript is here reproduced in the exact form in which it was received.

"Co-operators (in alphabetic order) of the International Congress of Ophthalmology, to be held in Amsterdam and The Hague, September 5-13, 1929.

"Symposium	Rapporteur	Domicile
"1. Geographical expansion and social international campaign against trachoma. Dr. Wibaut of Amsterdam will present and discuss the "mappa mundi" about the expansion of trachoma.	Arganaraz	Buenos-Aires
	Grönholm	Helsingfors
	von Gross	Budapest
	Maggiore	Sassari
	Mijashita	Tokio
	Sobhy Bey	Cairo
	Soria	Barcelona
"2. Etiology and nonoperative treatment of glaucoma.	Duke Elder	London
	Hagen	Oslo
	Magitot	Paris
	Wessely	Munich
"3. Diagnosis of suprasellar tumors.	Christiansen	Copenhagen
	Cushing	Boston
	Holmes	London
	Van Bogaert	Antwerp

"Moreover the following reports will be presented to the International Ophthalmological Council, who will publish and send these reports to the members of the Congress.

"Subject	Rapporteur	Domicile
"a. Examination of visual acuity.	Dufour	Nancy
	Elschnig	Prague
"b. Perimetry.	Lauber	Vienna
	Peter	Philadelphia
"c. Notation of the cylinder axis.	Traquair	Edinburgh
	Marquez	Madrid
	Nordenson	Upsala
"d. Examination of light sense.	Hertel	Leipzig
	Ovio	Padova
"e. Standardization of the visual examination of railwaymen, motor drivers, seamen and airmen.	Engelking	Freiburg i/Br.
	McMullen	London
	Onfray	Paris
	Verrey	Lausanne
"f. Uniformity in the program of ophthalmological studies.	Lindner	Detroit"
	Parker	Vienna